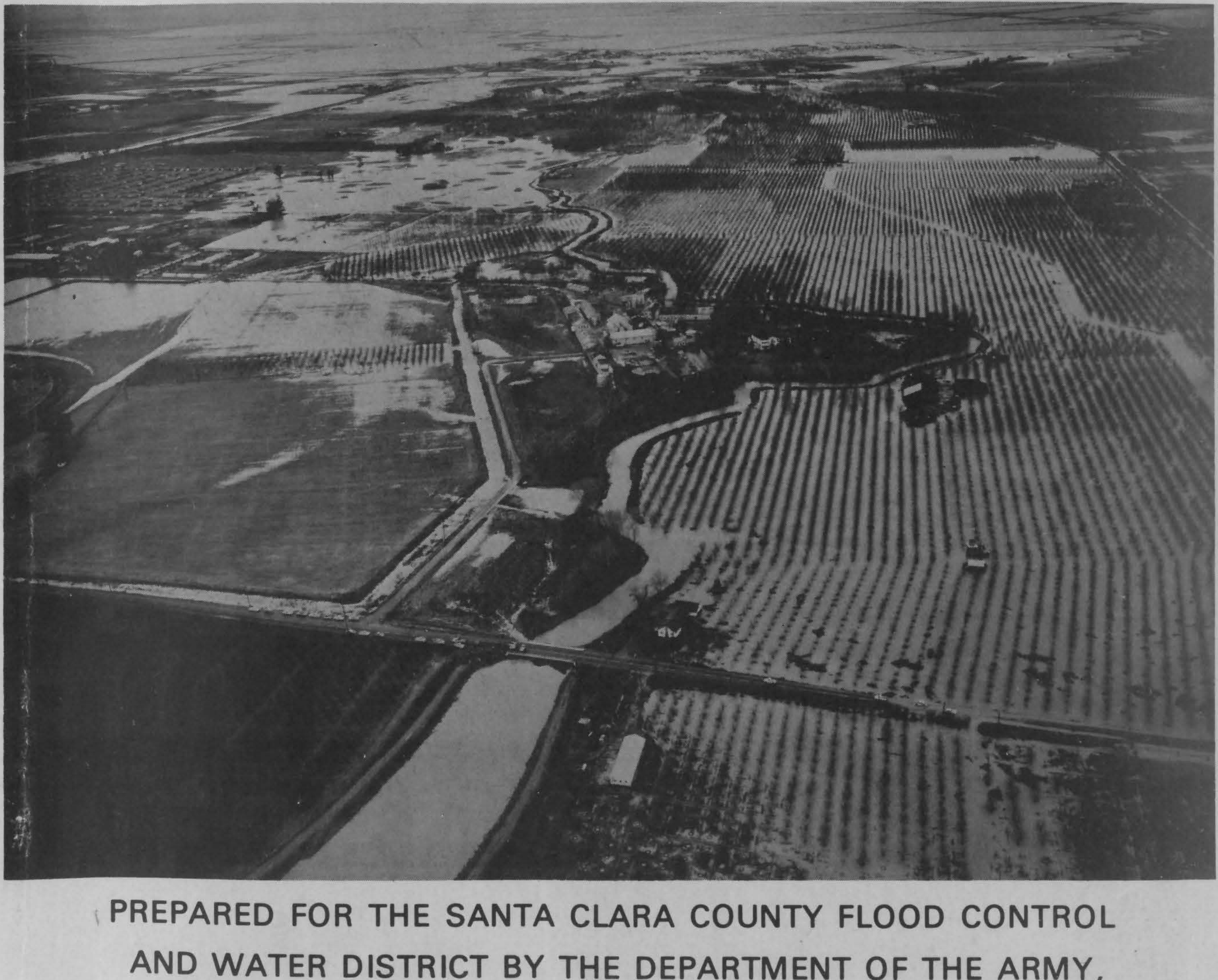
FLOOD PLAIN INFORMATION

GUADALUPE RIVER

SANTA CLARA COUNTY, CALIFORNIA



PREPARED FOR THE SANTA CLARA COUNTY FLOOD CONTROL
AND WATER DISTRICT BY THE DEPARTMENT OF THE ARMY,
SAN FRANCISCO DISTRICT, CORPS OF ENGINEERS
SAN FRANCISCO, CALIFORNIA
2.2.150-3 JANUARY 1972

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CONTENTS

Page

PREFACE i

BACKGROUND INFORMATION 2

- Settlement 2
- The Stream and Its Valley 3
- Developments in the Flood Plain 4

FLOOD SITUATION 5

- Data Sources and Records 5
- Flood Season and Flood Characteristics 8
- Factors Affecting Flooding and Its Impact 10
  - Flood Damage Reduction Measures 10
  - Obstructions to Floodflows 10

OTHER FACTORS 12

- Flood Warning and Forecasting 12
- Flood Fighting and Emergency Evacuation Plans . . . 12

PAST FLOODS 14

- Summary of Historical Floods 14
- Flood Descriptions 15

FUTURE FLOODS 18

- Intermediate Regional Floods 18
- Standard Project Storm and Flood 18
- Flooded Areas and Flood Damages 20
- Obstructions 20
- Velocities of Flow 21

GLOSSARY 22

COVER PHOTOGRAPH: Guadalupe River at Montague Road, Looking Downstream, 1963.

CONTENTS (Continued)

TABLES

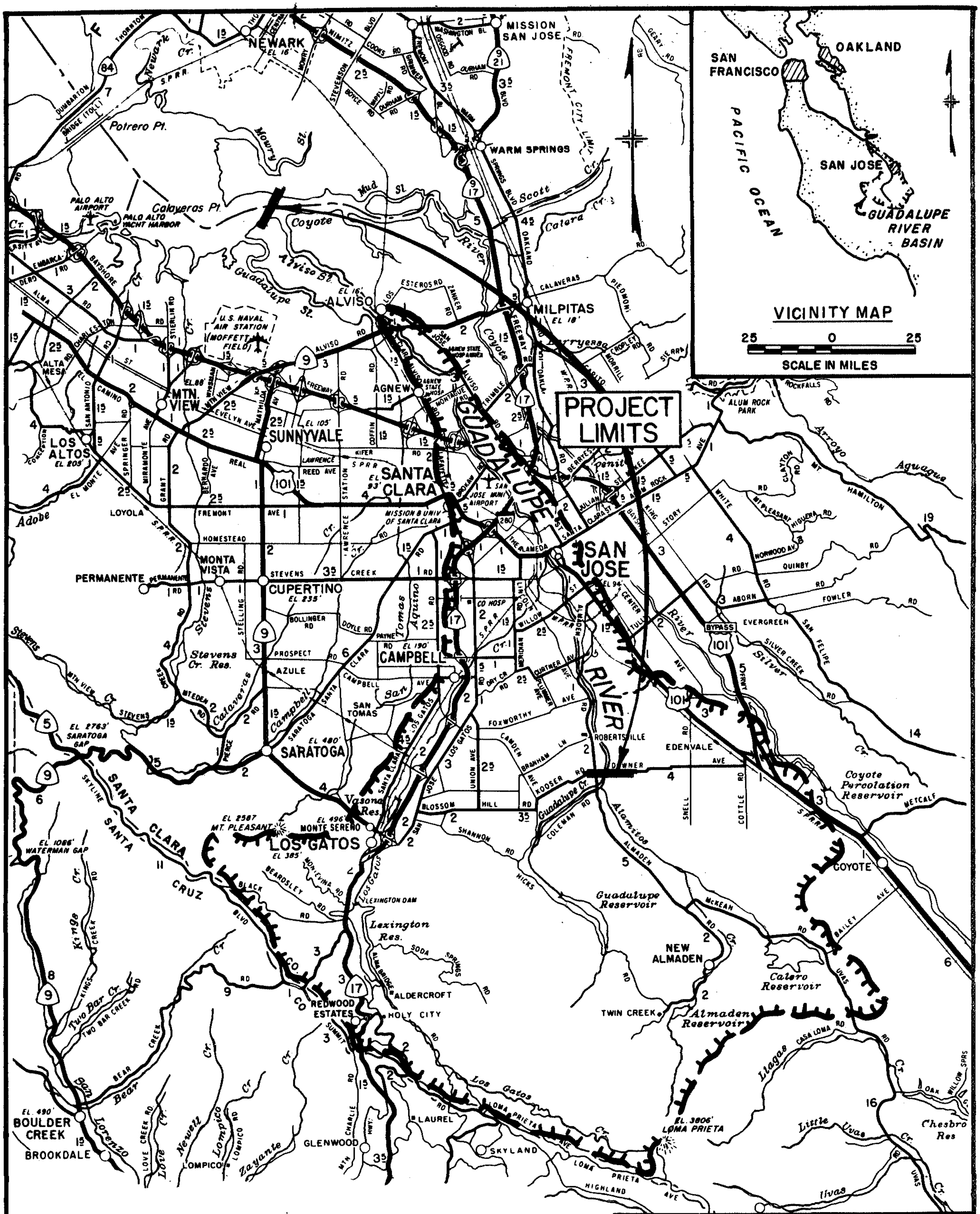
Table | Page
1 Guadalupe Basin Reservoirs 6
2 Guadalupe Basin Gaging Stations 7
3 Highest Discharges Since Reservoir Completion . 8
4 Bridge Data 11
5 High Water Years 14
6 Hydrologic Data 19

PLATES

Plate
1 General Map . . . . Opposite Page i
2 Hydrographs . . . . Follows Page 15
3 Flood Limit and Index Map .)
4-12 Flooded Areas)
13,14 High Water Profiles)
15-18 Selected Cross Sections) . . . At end of report

FIGURES

Figure
1 Guadalupe River Flood Plain at Alviso, 1963 . . 1
2 Guadalupe River Flood Plain at Golf Course below Lick Mill Road, 1963 9
3 Guadalupe River Flood Plain near Alviso, 1963 . 17



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Basin Boundary

FLOOD PLAIN INFORMATION STUDY

GUADALUPE RIVER

SANTA CLARA COUNTIES, CALIFORNIA

GENERAL MAP OF BASIN

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IN 1 SHEET MILES SHEET NO. 1
U.S. ARMY ENGINEER DIST., SAN FRANCISCO, C. OF E.
DRAWN: M.J.C. FILE NO.
TRACED: M.J.C. 78-52-6
CHECKED: M.A.B. DATED: JAN. 1972

PLATE 1

PREFACE

This report presents flood hazard information relative to the Guadalupe River in Santa Clara County, California, from San Francisco Bay upstream for about 17 miles to Blossom Hill Road.

Areas adjacent to the Guadalupe River, particularly in the community of Alviso (now San Jose), were inundated and sustained damage during the flood of record in 1958. Studies made for this report show that floods larger than those of the past could occur in the future in the San Jose area. Contained herein is information on past floods, and maps, profiles and cross sections that indicate the approximate extent and depth of inundation from large floods that can reasonably be expected to occur in the future. In this report these floods have been designated as the Intermediate Regional and Standard Project Floods.

This document was prepared at the request of the Santa Clara County Flood Control and Water District, and the California Department of Water Resources under the continuing authority provided the Corps of Engineers in Section 206 of the 1960 Flood Control Act (Public Law 86-645) as amended by Section 206 of the 1966 Flood Control Act (Public Law 89-789).

The report is for the use of local agencies and other flood plain users to guide the development of the flood plain in directions that will minimize flood hazard and future flood damages. The report provides Santa Clara County and the communities involved a basis for further study and planning for optimum use and development of flood-prone areas through zoning and subdivision regulations, construction of flood control projects, or by a combination of these and other approaches to reducing flood hazards and flood damage. Recommendations or plans for solution of flood problems in the study area are not included in this report. Neither does it extend any Federal authority over zoning or other regulation of flood plain use. Methods to minimize flood damages in flood prone areas, but still permit their optimum use and development, are introduced in a Corps of Engineers publication entitled "Guidelines for Reducing Flood Damages."[1/]

This report is based upon all available information bearing on the occurrence and size of floods in the San Jose - Alviso area.

The assistance and cooperation of the Santa Clara County Flood Control and Water District, California Department of Water Resources, California Division of Highways, and individuals who directly or indirectly aided in the preparation of this report, are gratefully acknowledged.

The Santa Clara County Flood Control and Water District will make the information in this report available to all interested agencies and individuals. Copies of the report and information on its use are available from that office. The San Francisco District of the Corps of Engineers will, upon request, provide technical assistance to Federal, State and local agencies in the interpretation and use of data presented herein, and will provide other available flood data related thereto.

[1/] Available upon request

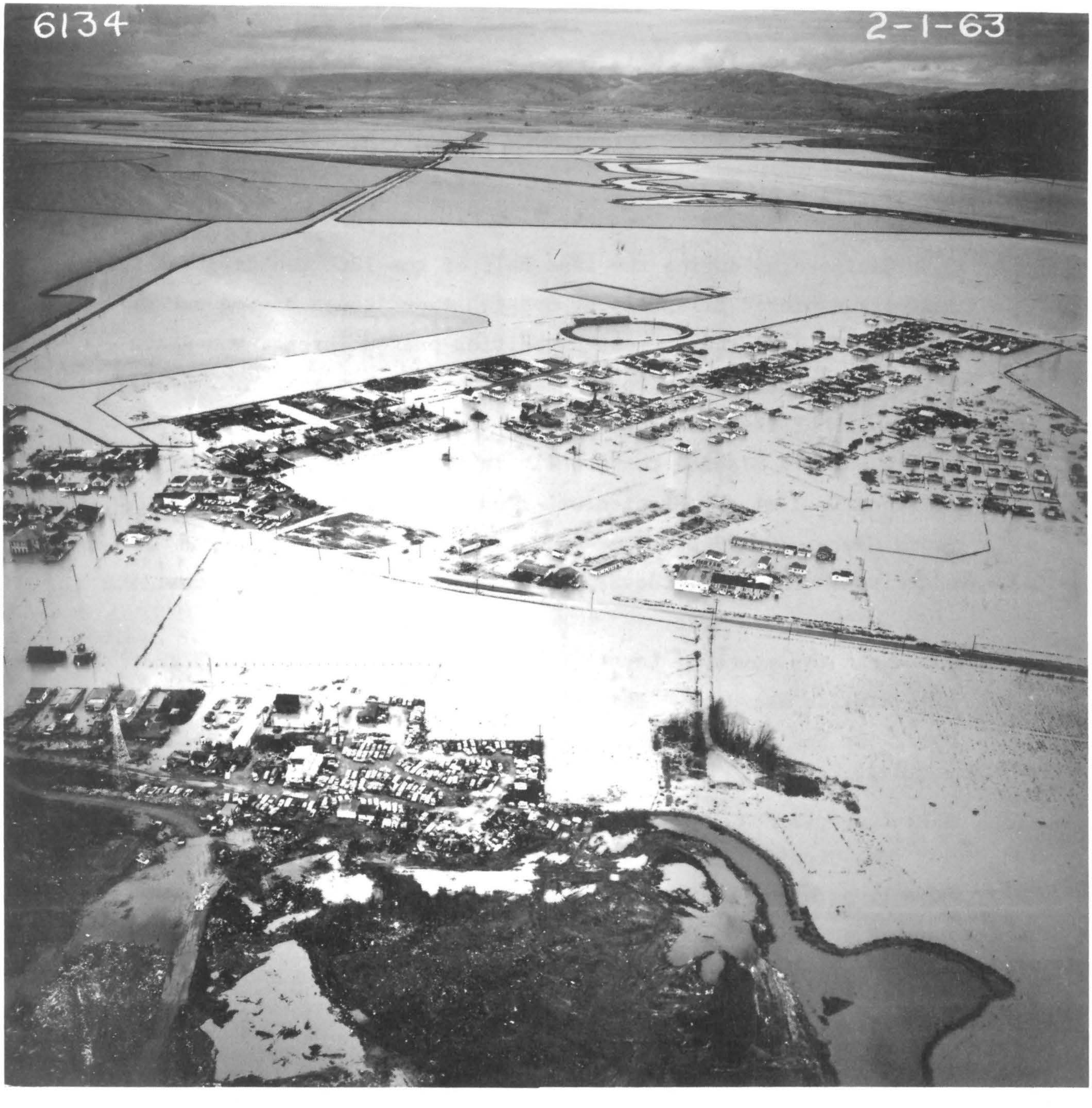


FIGURE 1

Guadalupe River Flood Plain
at Alviso, CA - 1963

BACKGROUND INFORMATION

Settlement

California, during the last half of the 18th century, was actively explored primarily by Spanish expeditions coming out of Mexico. In 1769 the Portola Expedition passed through the Santa Clara Valley on its way to the San Francisco Bay region. In 1777 the Spanish Fathers established, on the banks of the Guadalupe River, the 8th Mission to be built in California. After destruction by flood in 1784 the Mission was rebuilt in the nearby city of Santa Clara. On 29 November 1777, Carlos the Third of Spain established the Pueblo de San Jose de Guadalupe - now the bustling metropolis of San Jose.

Near the mouth of Coyote Creek, the Padres established in 1795 Mission San Jose. This Mission was in the nature of a cross road. It had access to San Francisco Bay and was on the north-south route to the San Francisco Bay region as well as on the main route to San Joaquin Valley to the east.

The Mission served as an overnight way station for the Padres as well as other Spanish travelers. However, it did host others such as a visit in 1806 by the Russian ship "Juno" out of Sitka, Alaska, and a visit in 1827 by the American trapper and explorer Jedediah Strong Smith.

Stanislaus County, to the east in San Joaquin Valley, was named for an Indian convert who lived at the Mission but later fled to the valley to escape the Spanish. Before submitting to Vallejo and his troops, Stanislaus and his followers beat off two Spanish punitive expeditions.

The American flag was raised over San Jose in 1846. Later the city served as the capital of the State of California.

At one time Alviso Landing was the southermost port on San Francisco Bay. It was once a lively port and the terminus of steamboats and schooners carrying on trade between San Francisco and San Jose. The advent of the railroad did much to dampen the prosperity of the port but for years it did a declining business in the export of fruit, farm products and general merchandise.

The Stream and Its Valley

The Guadalupe River begins at the confluence of Guadalupe Creek and Alamitos Creek, but its tributaries rise in the Santa Cruz Mountains. The river system drains an area of about 160 square miles. All of the watershed is within the boundaries of Santa Clara County. A general map of the basin is shown on Plate 1 of this report. Basin elevations range from slightly below sea level to about 3,000 feet above sea level. Three reservoirs in the upper basin, Calero, Almaden and Guadalupe, have a combined capacity of 15,530 acre-feet and contribute somewhat to the regulation of peak flows within the basin system. Additional regulation is derived from almost 27,000 acre-feet of reservoir storage on the Los Gatos Creek. The Guadalupe River flows generally northwestward through the cities of San Jose and Alviso and empties into San Francisco Bay about one and one-half miles west of the mouth of Coyote Creek. The study area is bounded by the Coyote Creek Basin on the east, the Santa Cruz Mountains on the south, the San Tomas - Saratoga Creek Basin on the west and San Francisco Bay to the north.

The area has a relatively mild climate, temperatures range from the average high of 81 degrees during July to an average low of 49 degrees in January. Ninety percent of the rainfall occurs in the late fall and winter months. January is usually the month with the most rainfall. Although thunderstorms do occur during the summer months, they do not contribute significantly to the annual precipitation.

Official flood records date from 1930 when a stream gage was established just downstream of Los Gatos Creek. Records are available from a number of other stations that have been operated intermittently by the U. S. Geological Survey and the Santa Clara County Flood Control and Water District.

Developments in the Flood Plain

Since World War II Santa Clara County has grown at an almost unbelievable rate. Light industry and housing tracts have gobbled up much former agricultural land and the population has more than doubled since 1950. Over ten percent of the largest industrial corporations in the nation maintain offices or other installations within the county. Research, especially in space exploration, has assumed national prominence in the area. Food processing centers have been a major industry in the area. Due to rapid urbanization and industrial growth, plus the diminishing availability of agricultural produce, this type of industry has begun to move to other locations. The growth of the area will continue at a rapid rate according to current economic growth projections.

FLOOD SITUATION

Data Sources and Records

Records from gaging stations have been maintained by the U. S. Geological Survey and Santa Clara County Flood Control and Water District since 1930. Many of the stations in the basin formerly recorded only low flows for percolation and were not applicable to the determination of flood flows. However, the Santa Clara County Flood Control and Water District now collect high flow data and has it available in their files. Table 2 lists the location and high flow records of U.S.G.S. gaging stations.

Floodflows in the basin are regulated to some extent by the water impoundment reservoirs within the system. Data on these reservoirs are included in Table 1. Storage releases are made within the system for municipal water, irrigation and percolation.

Table 3 lists crest stages and discharges that have occurred at the streamgaging station, Guadalupe River at San Jose since the construction of Lexington Reservoir in 1952. See also Table 1.

Rainfall records have been maintained in Santa Clara County since 1874. Records from about 130 gaging stations, many of which are currently in operation, are available from the Santa Clara County Flood Control and Water District. Rainfall records at U.S. Weather Bureau Stations are published in the various climatological data publications.

TABLE 1

GUADALUPE BASIN RESERVOIRS
(INCLUDING PERCOLATION)

Stream and/or Reservoir	Empty Min Pool El. ft. msl	El. Spillway feet msl	Capacity Acre ft	Drainage Area sq. mile	Built Yr	Type Construction
1. Alamitos Creek						
a. Calero Reservoir	393.7	483.90	10,280	6.9	1935	Rolled earth fill
b. Almaden Reservoir	533.1	606.87	1,790	12	1935	Rolled earth fill
2. Guadalupe Creek						
Guadalupe Reservoir	506.8	617.0	3,460	5.9	1935	Rolled earth fill
3. Los Gatos Creek						
a. Lake Elsman (Austrian Dam)	-	1,110.0	6,280	10	1950	Rolled earth fill
b. Lexington Reservoir	518.8	650.0	21,430	37	1953	Rolled earth fill
c. Vasona Reservoir	275.0	295.0	+ 10	-	1935	Rolled earth fill

TABLE 2

GUADALUPE BASIN GAGING STATIONS

				FLOODS			
Stream	Location	Record Begins	Drainage Area	Highest Unregulated	Water Year	Highest Regulated	Water Year
Alamitos Creek near Edenvale, Calif.	Gage moved in 1958 to location near New Almadin, Calif. with drainage area of 31.8 sq. miles	1930	34.6	2,670	1932	4,500	1958
Guadalupe Creek at Guadalupe, Calif.	Left bank 0.5 mile NW Guadalupe and 3.5 miles US confluence Alamitos Cr.	1930	12.7	1,160	1932	2,750	1958
Los Gatos Creek at Los Gatos, Calif.	Left bank 0.3 mile DS Trout Cr. 0.5 mile DS Lexington Res and 0.1 mile S Los Gatos	1930	38.6	7,110	1940	3,540	1958
Los Gatos Creek below Los Gatos, Calif.	350 ft DS Cypress Rd bridge and 0.9 mile NERR Station in Los Gatos	1944	42.6	5,600	1945	5,800	1952
Guadalupe River at San Jose, Calif.	Right bank 100 feet DS Los Gatos	1930	144	6,700	1932	9,150	1958

TABLE 3

GUADALUPE RIVER NEAR SAN JOSE [1]

HIGHEST FIVE DISCHARGES SINCE COMPLETION OF UPSTREAM RESERVOIRS [2]

Date of Crest	Gage Height feet	Discharge cfs	Order of Magnitude
23 December 1955	13.94	5,570	4
2 April 1958	16.55	9,150	1
13 October 1962	10.86	6,300	3
6 March 1967	11.55	6,760	2
30 January 1968	9.28	5,170	5

1/ For location see Table 2

2/ See Table 1

Flood Season and Flood Characteristics

The main flood season for the Guadalupe River extends from October through April when flooding may be caused by intense rainstorms over or adjacent to the Guadalupe Basin. Runoff quantities are affected by prior rainfall, soil condition and available storage capacity. Under proper conditions, a storm of smaller intensity may cause a flood of larger size than a greater storm. Contributions from other basins also can influence flood magnitude.

Discharge hydrographs of the 50 Year, the Intermediate Regional and Standard Project floods are given on Plate 2.

During a flood of the Intermediate Regional magnitude, flow depth would be at or above flood stage for about one day, and a flood of the Standard Project magnitude would be at or above the flood stage for about three days.

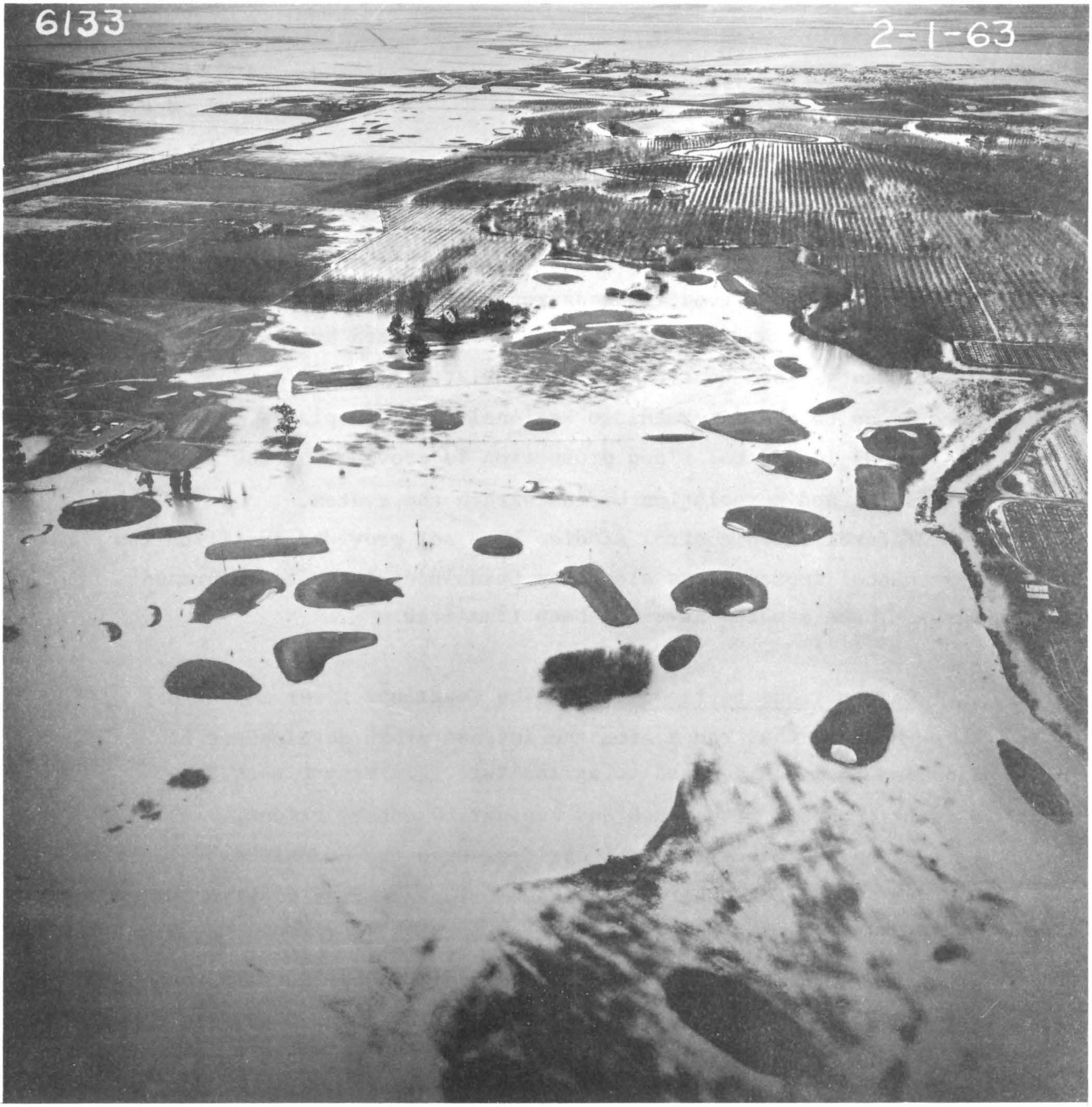


FIGURE 2

Guadalupe River Flood Plain at
Golf Course below Lick Mill Road, 1963

Factors Affecting Flooding and Its Impact

Flood damage reduction measures - These measures are limited to the construction and maintenance performed by local interests. Federal and State agencies have not participated in construction of formal damage prevention measures. Flood control works on the Guadalupe River and its tributaries, constructed by the Santa Clara County Flood Control and Water District, provide flood protection up to the Intermediate Regional Flood in places. Additional incidental flood protection is provided by the reservoirs and percolation basins within the system.

Federal flood control studies have not provided justification for channel improvements along the Guadalupe River at the present time. These studies have not been finalized.

Obstructions to floodflows - The Guadalupe River meanders through areas that range from the intense urban development of San Jose to lands devoted to agriculture. In many places the stream is choked with brush and has narrow constrictions.

Along the study reach, 42 bridges span the Guadalupe. The design and construction of these bridges varies widely. Bridge location and characteristics are shown in Table 4.

Land subsidence resulting from subsurface fluid extraction has greatly increased the flood hazard in the lower reaches of the Guadalupe River. In some areas land subsidence has been as much as 14 feet and has averaged 8 or 9 feet over the area subject to flooding.

TABLE 4

GUADALUPE RIVER - BRIDGE DATA

	BRIDGE	Approximate River Mile	Roadway *	Low Chord *	Thalweg of Streambed *	1963 Flow HWM *	HEIGHT OF FLOOD ABOVE (+) OR BELOW (-) LOW CHORD	
							IRF	SPF
1.	SPRR at Alviso	4.2	17.0	12.0	- 8.0	-	-4.5	-4.1
2.	Gold Street	4.3	16.0	12.0	- 8.0	-	-4.4	-3.9
3.	Highway 237	4.8	15.0	13.2	- 6.7	-	-3.5	-2.5
4.	Montague Expressway	5.3	29.5	26.5	5.5	-	-5.9	-4.5
5.	Trimble Road	8.4	38.5	34.0	15.0	-	-4.4	-2.5
6.	Bayshore Freeway	8.9	41.5	38.5	18.0	29.6	-3.8	-2.0
7.	Brokaw Road	9.6	50.0	45.5	25.5	34.0	-6.1	-4.0
8.	Highway 17 (Nimitz)	10.8	72.0	67.0	43.0	-	-9.5	-7.5
9.	Hedding Street	11.1	69.0	66.0	44.0	-	-0.5	+3.4
10.	West Taylor Street	11.5	72.0	69.0	48.0	-	+1.3	+2.7
11.	Hobson Street	11.6	75.0	72.0	55.0	-	+1.3	+2.6
12.	Coleman Avenue	11.9	77.0	74.0	59.0	-	+2.0	+2.9
13.	SPRR Trestle	12.0	83.0	79.0	60.0	68.8	-2.0	-1.0
14.	SPRR Trestle	12.0	84.0	79.5	61.0	-	-2.0	-1.4
15.	SPRR Trestle	12.0	83.0	78.0	61.0	-	+0.3	+0.5
16.	SPRR Trestle	12.1	81.0	76.5	63.0	73.0	+1.0	+3.5
17.	Julian Street	12.2	82.5	79.0	64.0	-	+3.9	+4.3
18.	St. John Street	12.4	84.0	79.5	65.5	-	+5.5	+5.5
19.	West Santa Clara St	12.5	86.5	81.0	66.5	79.2	+6.2	+6.2
20.	West San Fernando	12.7	86.5	83.0	69.0	81.7	+5.3	+5.3
21.	Park Avenue	12.8	90.0	87.5	72.0	-	+1.2	+1.2
22.	Prevost Street	12.9	90.0	87.5	72.0	85.2	+1.8	+1.8
23.	West San Carlos	13.0	90.0	88.0	74.0	-	+3.0	+3.0
24.	Auzerais	13.1	91.5	88.5	76.0	88.6	+4.0	+4.0
25.	Grant Street	13.4	97.5	94.5	81.0	91.3	+1.5	+1.5
26.	West Virginia Street	13.6	101.5	98.5	82.5	95.6	0	0
27.	SPRR Trestle	13.8	113.5	105.0	86.5	100.4	-1.0	-1.0
28.	Willow Street	14.0	109.0	106.0	88.0	102.8	+2.3	+2.3
29.	West Alma Avenue	14.5	114.0	111.0	96.0	109.4	+5.0	+5.0
30.	SPRR Trestle	14.6	120.0	116.5	98.0	112.8	+0.1	+0.1
31.	Willow Glen Way	14.9	126.0	124.5	104.0	-	-1.6	-1.6
32.	Malone Road	15.4	134.5	131.0	112.0	125.4	+0.7	+0.7
33.	Curtner Avenue	15.8	144.0	141.5	122.0	-	-4.5	-4.5
34.	Almaden Expressway S	16.1	149.0	143.5	124.0	-	-1.0	-1.0
35.	Bridge No. 256 **	16.2	151.0	147.0	124.0	-	-2.3	-2.3
36.	Almaden Expressway N	16.3	152.0	148.5	126.0	-	-2.6	-2.6
37.	Koch Lane (Private)	16.8	152.0	150.0	132.0	-	+2.0	+2.0
38.	Hillsdale Avenue	17.0	152.0	160.0	140.0	150.1	-5.6	-2.2
39.	Capitol Expressway	17.1	159.0	156.0	141.0	-	-0.5	+3.0
40.	Steval Dr (Private)	17.2	162.6	-	142.0	-	-	-
41.	Branham Lane	18.1	177.0	171.0	158.0	164.4	-5.3	-1.1
42.	Blossom Hill Road	19.1	193.0	190.0	172.0	179.0	-9.0	-5.6

** Abandoned and will be removed

OTHER FACTORS

Flood warning and forecasting

No specific river or flood forecasts are issued for the Guadalupe River by the Federal - State River Forecast Center in Sacramento. However, forecasts of heavy rain are provided to Santa Clara County Flood Control and Water District by the National Oceanic and Atmospheric Administration, National Weather Service Forecast Office in San Francisco. The Santa Clara County Flood Control and Water District maintains a "weather watch" during the rainy season for use in their weather and flood operations.

Flood fighting and emergency evacuation plans

Santa Clara County Flood Control and Water District does not have flood fighting and emergency evacuation plans as such. The District has organized an Emergency Operations Center which consists of a Chief of Emergency Operations, a Public Information Officer, an Emergency Coordinator, and related support staffing. Four additional units, Data Collection, Flood Information, Water Operations, and Emergency Actions complete the organization.

The Emergency Operations Center is maintained in an "Alert" status from 1 October to 1 May each year. When the apparent situation requires 24-hour vigilence, the Center goes into a "Pre-Emergency" operation. As the gravity of the situation increases and flooding is occurring and threatens to increase, a full "Emergency" condition is entered into. Upon termination of emergency conditions, the Center reverts to the "Alert" status until the situation again changes or the flood season terminates.

Under the Center operation the Data Collection and Flood Information Units primarily collect, organize, coordinate and publish information relating to the flood situation, flooding and flood damage. The Water Operation Unit operate the water system - reservoirs, pipelines, canals, etc. in order to minimize flooding and flood damage.

The Emergency Actions Unit with available crew does all emergency maintenance within its capabilities and supervises and coordinates the work of others.

Requests for Federal and/or State aid are initiated, coordinated and supervised through the Emergency Operations Center.

PAST FLOODS

Summary of Historical Floods

The greatest flood known to have occurred on the Guadalupe River since the stream gage was established in 1930 was in April 1958. Peaks are primarily affected by the upstream reservoir storage but may be affected by diversions upstream by the San Jose water works for urban use and for diversions to percolation reservoirs. High water also occurred in other years as is shown in Table 5. The 1955 flood was greater than the 1958 event on all Santa Clara County watersheds other than the Guadalupe. However, the upstream Guadalupe Basin reservoirs were almost empty and played an important role in reducing the magnitude of flooding on the Guadalupe River.

TABLE 5

GUADALUPE RIVER - PEAK FLOWS OF HISTORICAL FLOODS

USGS Gage on Right Bank 100 Feet Downstream
of Los Gatos Creek

Water Year	Date	Gage Height feet	Quantity cfs
1932	27 December 1931	11.12	6,700
1937	13 February 1937	9.64	6,070
1938	11 December 1937	9.80	6,660
1940	27 February 1940	11.88	8,680
1941	4 April 1941	9.50	6,330
1943	23 January 1943	10.68	6,350
1945	4 February 1945	11.25	6,600
1952	12 January 1952	15.2	8,000
1956	23 December 1955	13.94	5,570
1958	2 April 1958	16.55	9,150
1963	13 October 1962	10.86	6,300
1967	6 March 1967	11.55	6,760
1968	30 January 1968	9.28	5,170

Flood Descriptions

The following newspaper extracts refer to the flood of 1958.

Palo Alto Times - Tuesday, April 1, 1958

" . . . . Hardest hit was Alviso, where a third to a half of the town was under water by noon today. A state of civil emergency was declared to cope with 'the worst flooding in four or five years' . . . Guadalupe River which runs through San Jose and empties into the Bay at Alviso, was on the rampage, . . ."

Richmond, California Independent - April 2, 1958

" . . . . A three-foot blanket of water covered Alviso today, forcing the evacuation of 900 of the town's 1,054 residents. . . .

Visalia, California Times - Delta - April 2, 1958

" A state of disaster was declared today in the flood swept town of Alviso, at the southern tip of San Francisco Bay.

Mayor Tony Santos issued the proclamation on the advice of Colonel Rowland S. Brown, USA, Retired, Assistant Regional Coordinator of the California Disaster Office.

The proclamation was issued after levees broke in two places outside the city limits, allowing additional flood waters to sweep in. . . . ."

San Jose News - April 8, 1958

" . . . . Specifically, the Council asked that the Guadalupe River channel be improved and lined with concrete.

The river was San Jose's chief trouble-maker last week, dumping water on considerable adjacent private property, homes, and city streets.

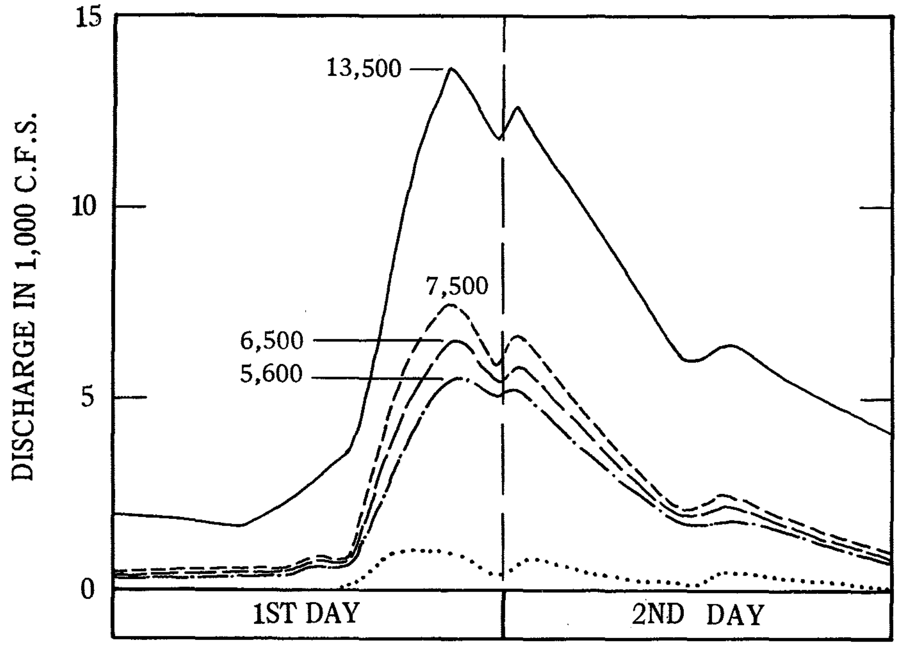
City Manager Hamann said that a few more hours of rain would have flooded the Civic Center and 'flooded it badly' . . . . ."

Surveys were made in the Guadalupe River basin to estimate damages and areas flooded as a result of stream-bank overflow. Flooding occurred in San Jose inundating a two-block area and depths of flooding ranged up to about four feet. Additional flooding occurred at different points along the lower reaches of the stream to the mouth at Alviso. Residential damage in the small area flooded in San Jose was relatively minor. Commercial and industrial damages, with the exception of one large firm, were not severe. Major sources of damages were in the basin's agricultural sector and in Alviso. About 2,700 acres of agricultural land, mostly pear orchards, were flooded and all of Alviso was inundated for seventeen days. Inundation caused extensive damage to industrial, commercial and residential property. A summary of damage by major category follows:

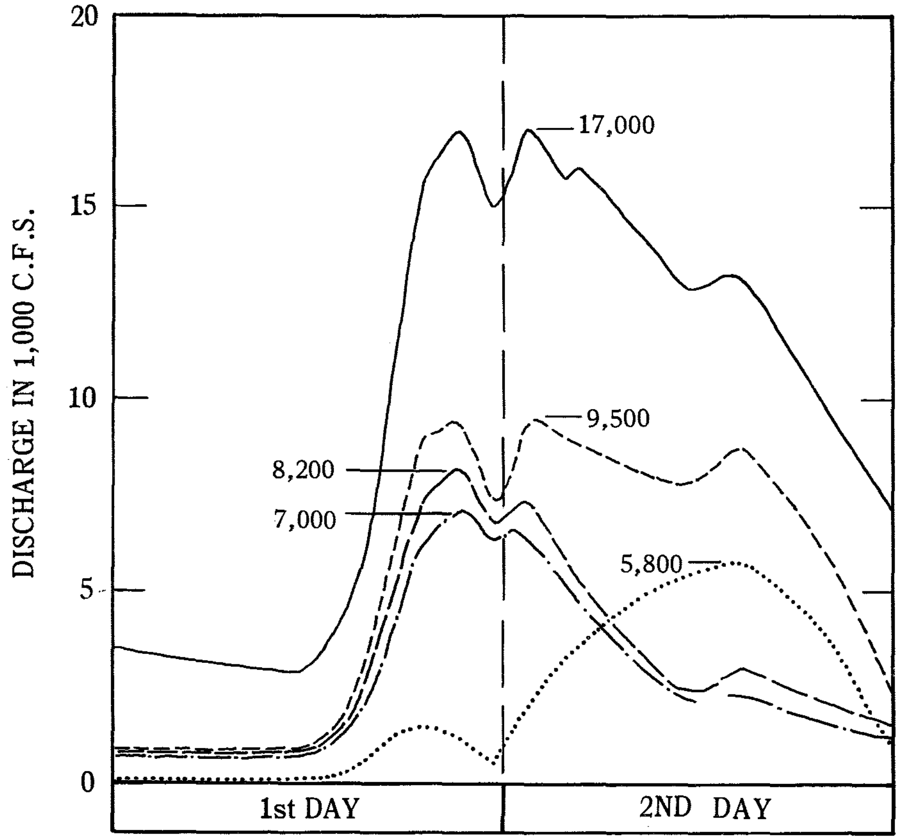
GUADALUPE RIVER (Main Stem) - SUMMARY OF DAMAGES

Damage Category	December 1955	April 1958
Agricultural	$ 246,600	$ 192,000
Residential	56,000	217,000
Commercial	183,000	625,000
Industrial	126,200	22,000
Public Facilities	141,700	292,000
	$ 753,500	$ 1,348,000

THE "50 – YEAR" AND "100 – YEAR" EVENT DISCHARGE HYDROGRAPHS SHOWN BELOW ARE BASED ON ANALYSES OF THE 31 MAR – 2 APRIL 1958 STORM.

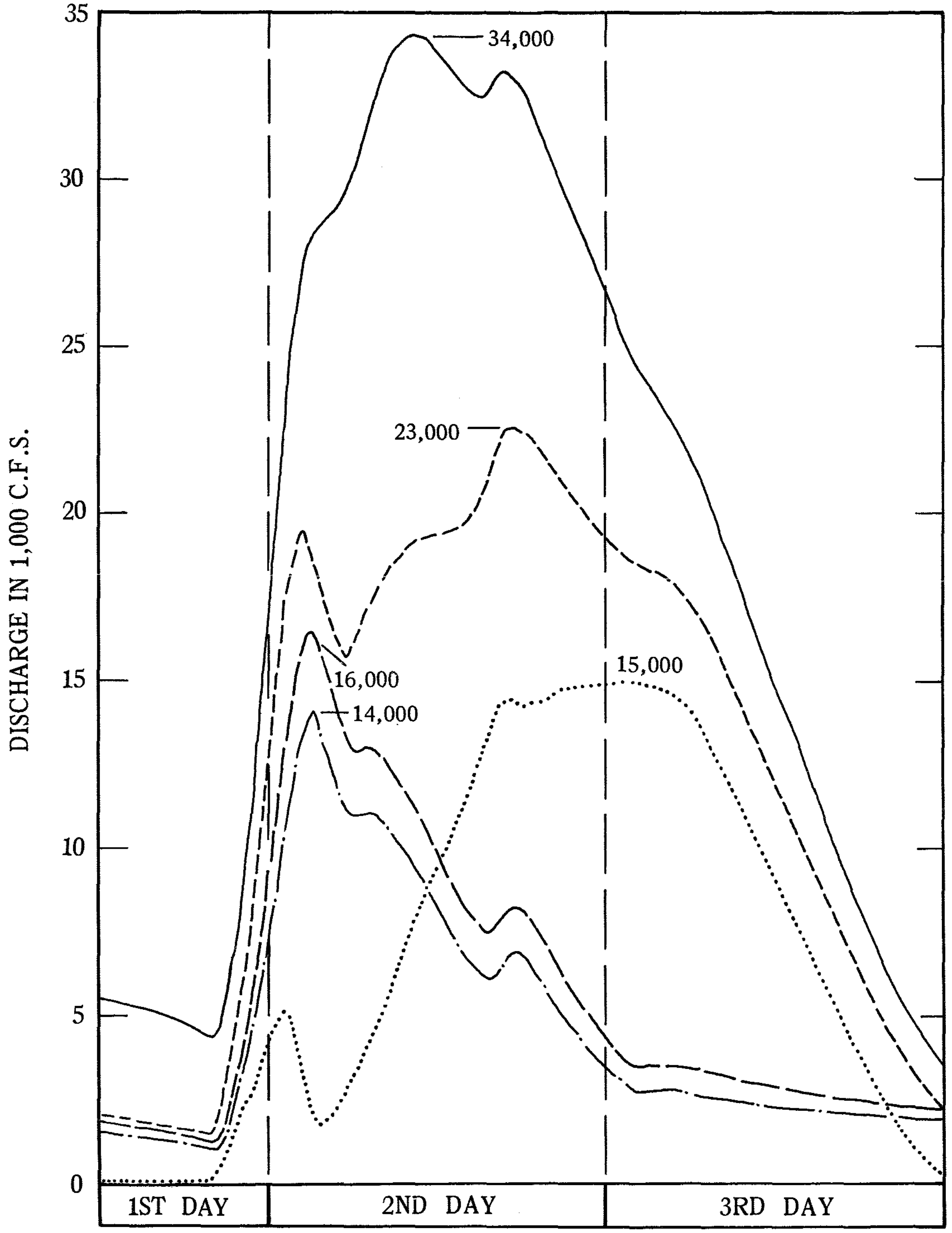


"50 – YEAR" EVENT



"100 – YEAR" EVENT

THE DISCHARGE HYDROGRAPHS SHOWN BELOW HAVE BEEN DEVELOPED BY TRANSPOSING THE 21–24 DEC 1955 STORM OVER THE 146 SQ. MI. AREA ABOVE SAN JOSE



"S. P. F." EVENT

LEGEND

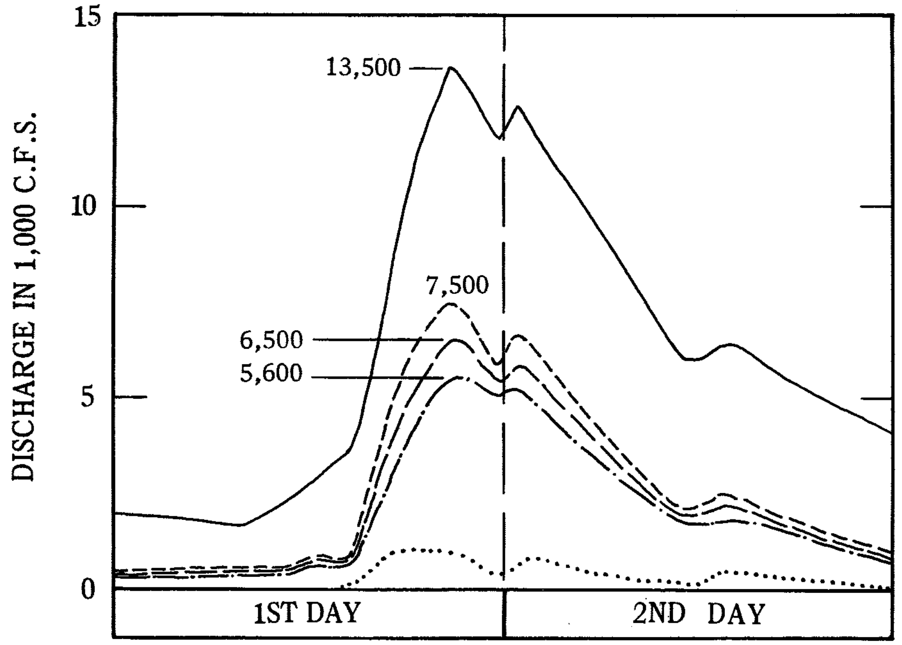
———————	GUADALUPE RIVER BELOW LOS GATOS CREEK.
– – – – – –	GUADALUPE RIVER BELOW CANOAS CREEK.
················	CANOAS CREEK, INCLUDING COYOTE CR. OVERFLOW.
—— —— ——	GUADALUPE RIVER ABOVE CANOAS CREEK.
—·—·—	GUADALUPE RIVER BELOW ALAMITOS CREEK.

FLOOD PLAIN INFORMATION STUDY
GUADALUPE RIVER
SANTA CLARA, CALIFORNIA

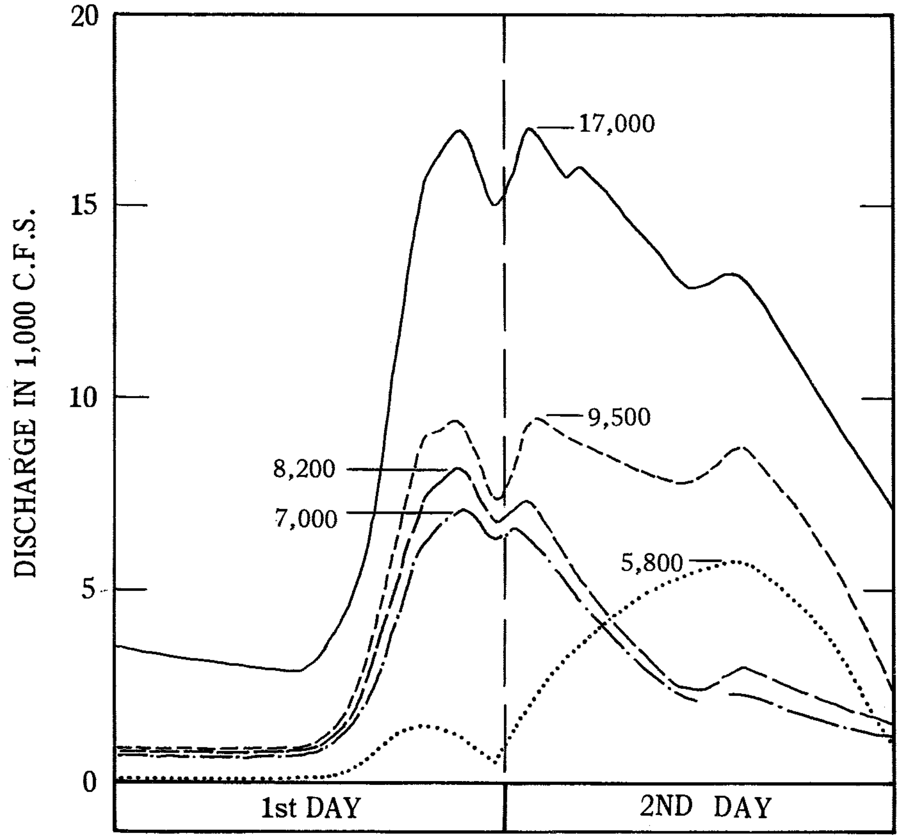
REPRESENTATIVE DISCHARGE
HYDROGRAPHS, INCLUDING
OVERFLOW FROM COYOTE CREEK

U.S. ARMY ENGINEER DIST., SAN FRANCISCO, C OF E
FILE NO.
TO ACCOMPANY REPORT DATED JAN. 1972
78-47-2

THE "50 - YEAR" AND "100 - YEAR" EVENT DISCHARGE HYDROGRAPHS SHOWN BELOW ARE BASED ON ANALYSES OF THE 31 MAR - 2 APRIL 1958 STORM.

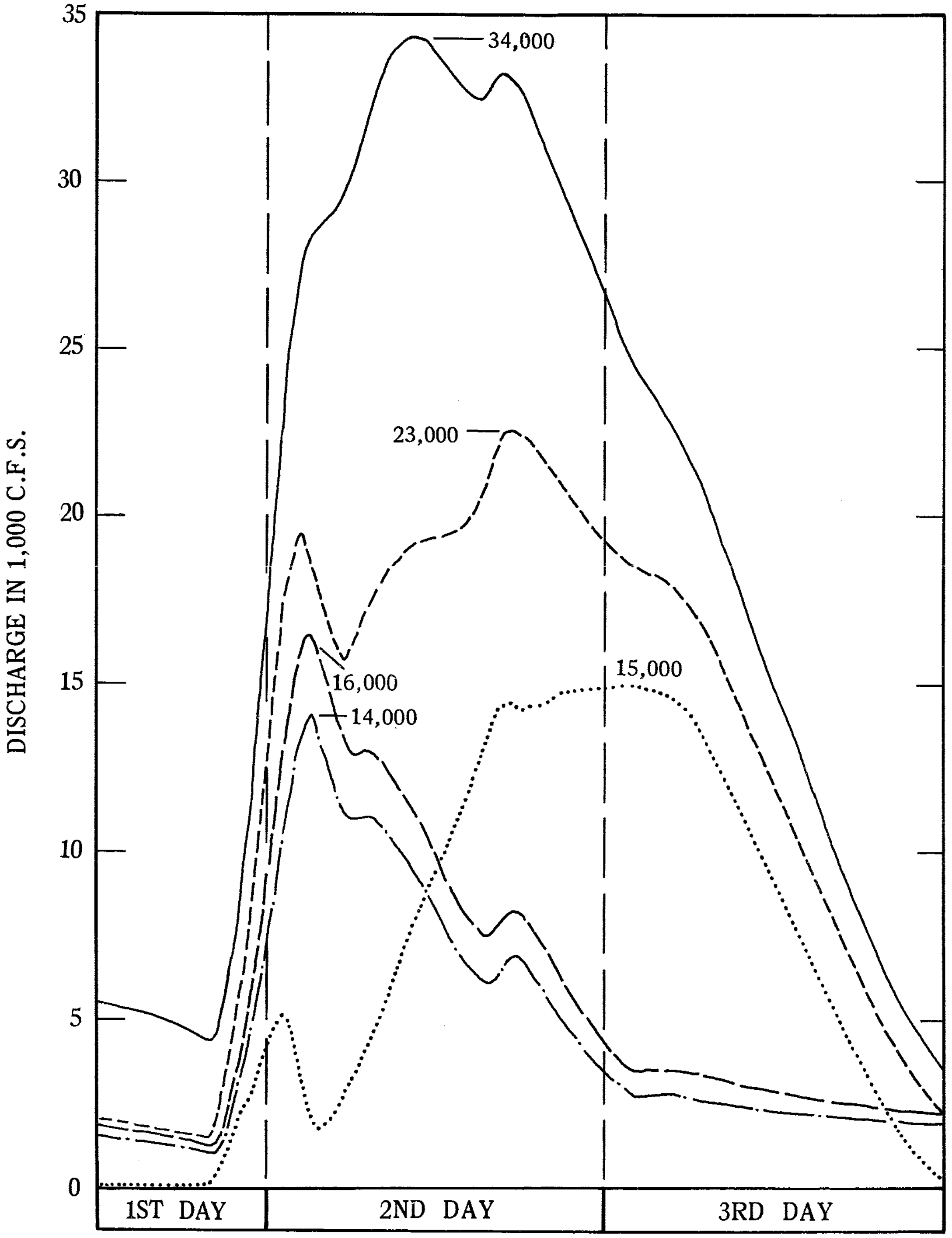


"50 - YEAR" EVENT



"100 - YEAR" EVENT

THE DISCHARGE HYDROGRAPHS SHOWN BELOW HAVE BEEN DEVELOPED BY TRANSPOSING THE 21-24 DEC 1955 STORM OVER THE 146 SQ. MI. AREA ABOVE SAN JOSE



"S.P.F." EVENT

LEGEND

——————— GUADALUPE RIVER BELOW LOS GATOS CREEK.

- - - - - - - GUADALUPE RIVER BELOW CANOAS CREEK.

··················· CANOAS CREEK, INCLUDING COYOTE CR. OVERFLOW.

—— —— —— GUADALUPE RIVER ABOVE CANOAS CREEK.

—·—·— GUADALUPE RIVER BELOW ALAMITOS CREEK.

FLOOD PLAIN INFORMATION STUDY
GUADALUPE RIVER
SANTA CLARA, CALIFORNIA

REPRESENTATIVE DISCHARGE HYDROGRAPHS, INCLUDING OVERFLOW FROM COYOTE CREEK

U.S. ARMY ENGINEER DIST., SAN FRANCISCO, C OF E
FILE NO.
TO ACCOMPANY REPORT 78-47-2
DATED JAN. 1972

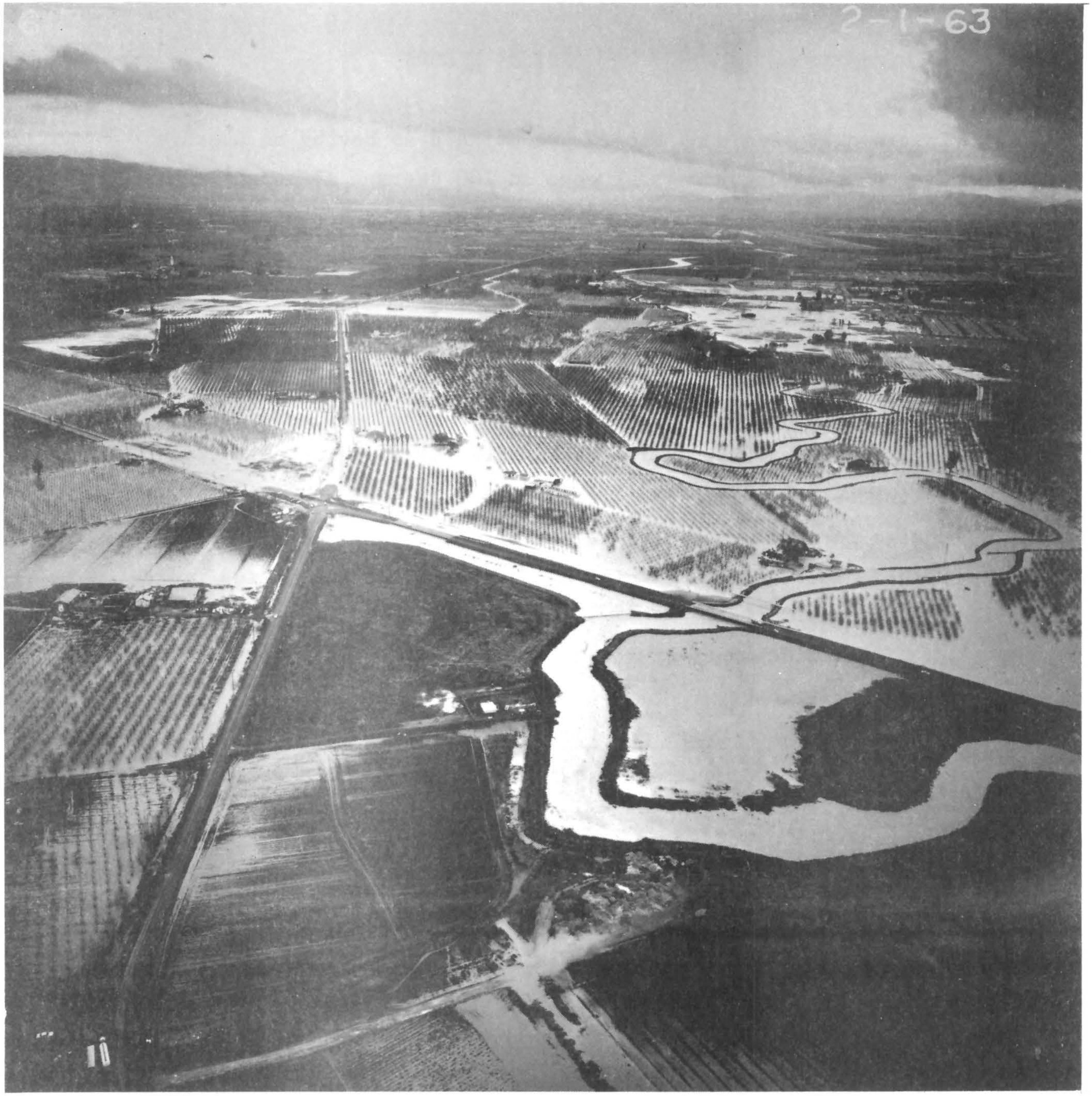


FIGURE 3

Guadalupe River Flood Plain near
Alviso, CA, 1963

FUTURE FLOODS

Intermediate Regional Floods are defined as having an average frequency of occurrence of once in 100 years. Although it has a recurrence interval of 100 years, the flood could occur more than once in a flood season or could occur several times in a decade.

Limitations in flood records and rainfall data require the analysis of records over the entire region under study. From these regional analyses and from statistical analysis of streamflow records available for the entire watershed, probability estimates are made. The frequency analysis of annual peak discharge for the periods of record was made by standard analytical methods adopted by the Corps of Engineers for estimating flood frequencies.

Peak discharges of the Intermediate Regional Flood are shown in Table 6.

Standard Project Storm and Flood

The term "Standard Project Storm" denotes the storm used to derive the Standard Project Flood and represents the most severe combination of meteorological and hydrological conditions reasonably characteristic of the region excluding extremely rare combinations or events. The Standard Project Flood is developed from this storm by assuming the storm is centered over the study basin with antecedent conditions reasonably favorable to runoff. The Standard Project Flood is used as a basis for evaluating the degree of protection provided by a selected design discharge and usually establishes the upper limit of discharge values considered for channel or flood-control storage design. Notably severe storms which have proven critical in establishing the standard project storm of other streams in the San Francisco Bay area are 9 to 12 December 1937, 21 to 24 December 1955, and 11 to 13 October 1962.

TABLE 6

HYDROLOGIC DATA

Index Point	Drainage Area (sq.mi)	1936-56 Normal Annual Precipitation (inches)	72-Hour Storm (basin inches)		Standard Project Flood Peak Discharge cfs			Intermediate Regional Flood Peak Discharge cfs			January 1963 Flood
			Rainfall	Runoff	In Channel	Overbank	Total	In Channel	Overbank	Total	cfs
Guadalupe River below Alamitos Cr.	53	26	13.6	9.0	14,000	0	14,000	7,000	0	7,000	5,500
Guadalupe River above Ross Creek	55	26	13.5	9.0	14,000	0	14,000	7,200	0	7,200	
Ross Creek	10	20	10.6	7.4	1,800	2,000	3,800	1,800	500	2,300	
Guadalupe River below Ross Creek	65	25	13.1	8.8	14,000	2,000	16,000	7,900	0	7,900	
Guadalupe River above Cauoas Creek	70	25	12.8	8.6	8,200	8,000	16,200	8,200	0	8,200	
Cauoas Creek	17	15	8.0	4.1	2,000	13,000	15,000	2,000	3,800	5,800	
Guadalupe River below Canoas Creek	87	23	11.9	7.7	10,000	13,000	23,000*	9,500	0	9,500	
Guadalupe River above Los Gatos Cr.	93	22	11.7	7.6	6,000	17,000	23,000	6,000	4,000	10,000	
Los Gaots Cr.	54	35	18.4	12.0	7,000	8,000	15,000	7,000	300	7,300	700
Guadalupe River below Los Gatos Cr.	147	27	14.2	9.2	13,000	21,000	34,000	13,000	4,000	17,000	6,200

*Includes 4,000 cfs overflow from Coyote Creek

The Corps of Engineers does not assign a frequency to the Standard Project Flood. It is larger than the Intermediate Regional Flood and generally is larger than any flood that has occurred on the subject stream.

In the recorded history of the western United States, it is doubtful if any of the streams have experienced the largest flood that is likely to occur. Floods potentially larger than the Standard Project Flood are entirely possible but are generally only considered in the design of dams. Consideration of these extremely rare floods should not be overlooked in the solution of any problem.

Flooded areas and flood damages

Plate 3 is the index map of the flooded areas shown on Plates 4 through 12.

Depths of overflow are generally limited to one or two feet in the upper reaches but in the lower reaches subject to subsidence and tidal action of the bay the controlling factor becomes the bay water surface and the dikes that hold back the bay water.

A further complicating factor is the commingling of floodwaters from many streams in the lower reach of their channels near San Francisco Bay. This necessitates the selection of arbitrary flood plain limits in this area.

Obstructions

As previously indicated, 42 bridges span the Guadalupe River in the study area.

During floods, debris collecting on bridges and culverts could decrease their carrying capacity and cause greater water depths (backwater effect) upstream of these structures. Since the occurrence and amount of debris are indeterminate factors, only the physical characteristics of the structures were considered in preparing profiles of the Intermediate Regional and Standard Project Floods. Similarly, the maps of flooded areas show the backwater effect of obstructive bridges and culverts, but do not reflect increased water surface elevation that could be caused by debris collecting against the structures, or by deposition of silt in the stream channel under structures. Of the 42 bridges and culverts crossing the streams in the study area, most of them are obstructive to the Intermediate Regional Flood and, even more, are obstructive to the Standard Project Flood.

Velocities of flow - Channel features, such as slope, roughness, shape, and area of cross section control the velocity of flow. Channel obstructions, such as bridge piers and abutments, as well as natural outcropping, excessively large trees and other abnormal channel restrictions, both natural and man-made, often cancel out channel characteristics that would produce rapid flow.

Velocity in the Guadalupe River ranges from about one foot per second at San Francisco Bay to about 12 feet per second in the upper study reaches. These velocities are average for the section and point velocities could be 30 to 40 percent greater.

Overbank velocities in the lower reaches are less than one foot per second. Velocities of 4.5 feet per second in the overbank areas upstream of West Virginia Street could be expected.

GLOSSARY

Flood. The general and temporary condition of partial and complete inundation of normally dry land areas from the overflow of streams, rivers, or other inland waterways. Flooding may also result from tidal surges, abnormally high tidal water, tsunamis or rising coastal waters that result from hurricanes or other severe storms.

Flood Crest. The maximum stage or elevation reached by the waters of a flood at a given location.

Flood Peak. The maximum instantaneous discharge rate of a flood at a given location. It usually occurs at or near the time of the maximum stage or crest.

Flood Plain. The relatively flat area or low land adjoining the channel of a river, stream, watercourse, ocean, lake or other body of standing water, which has been or may be covered by floodwater.

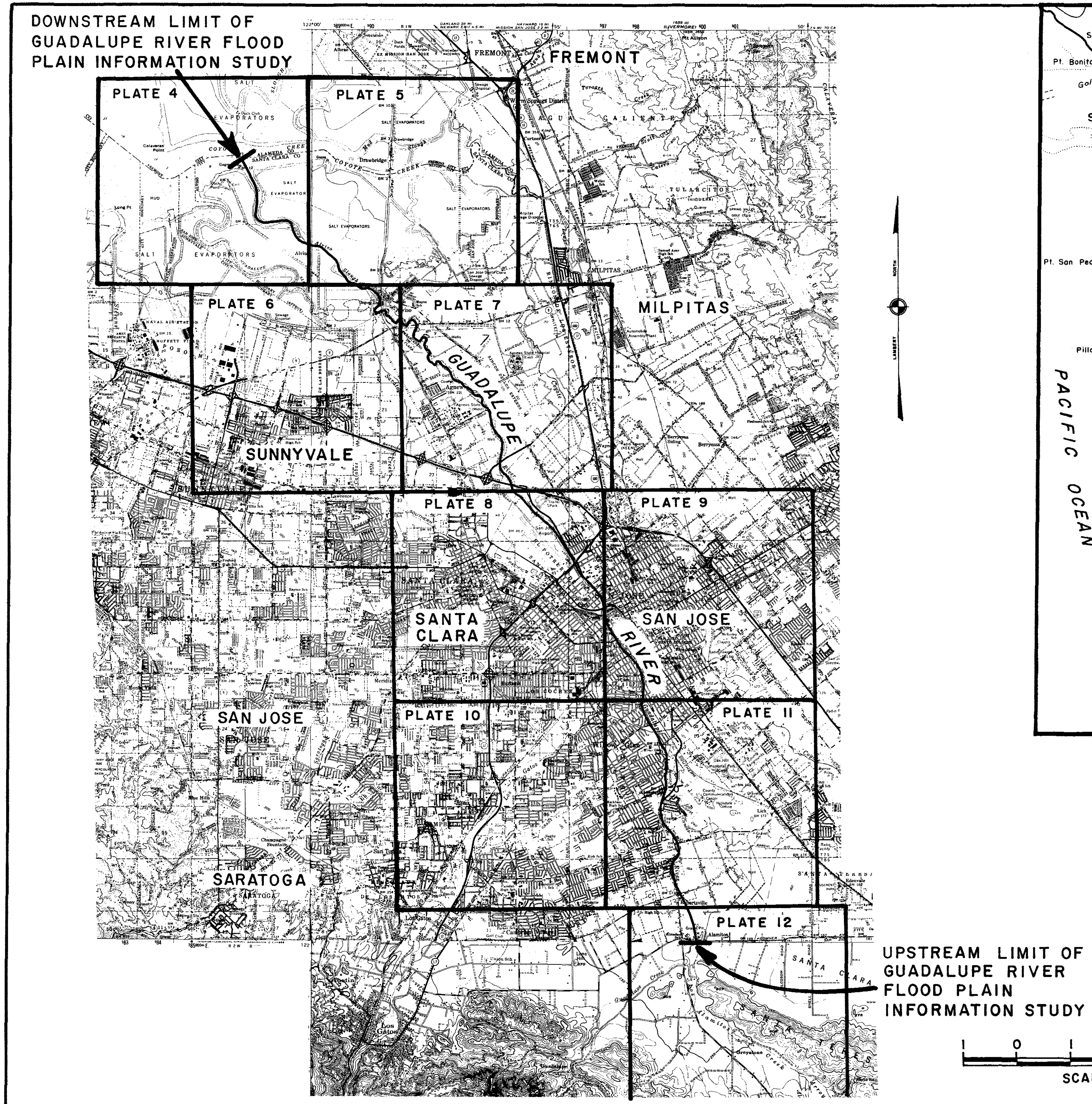
Flood Profile. A graph showing the relationship of water surface elevation to location, the latter generally expressed as distance above mouth for a stream of water flowing in an open channel. It is generally drawn to show surface elevation for the crest of a specific flood, but may be prepared for conditions at a given time or stage.

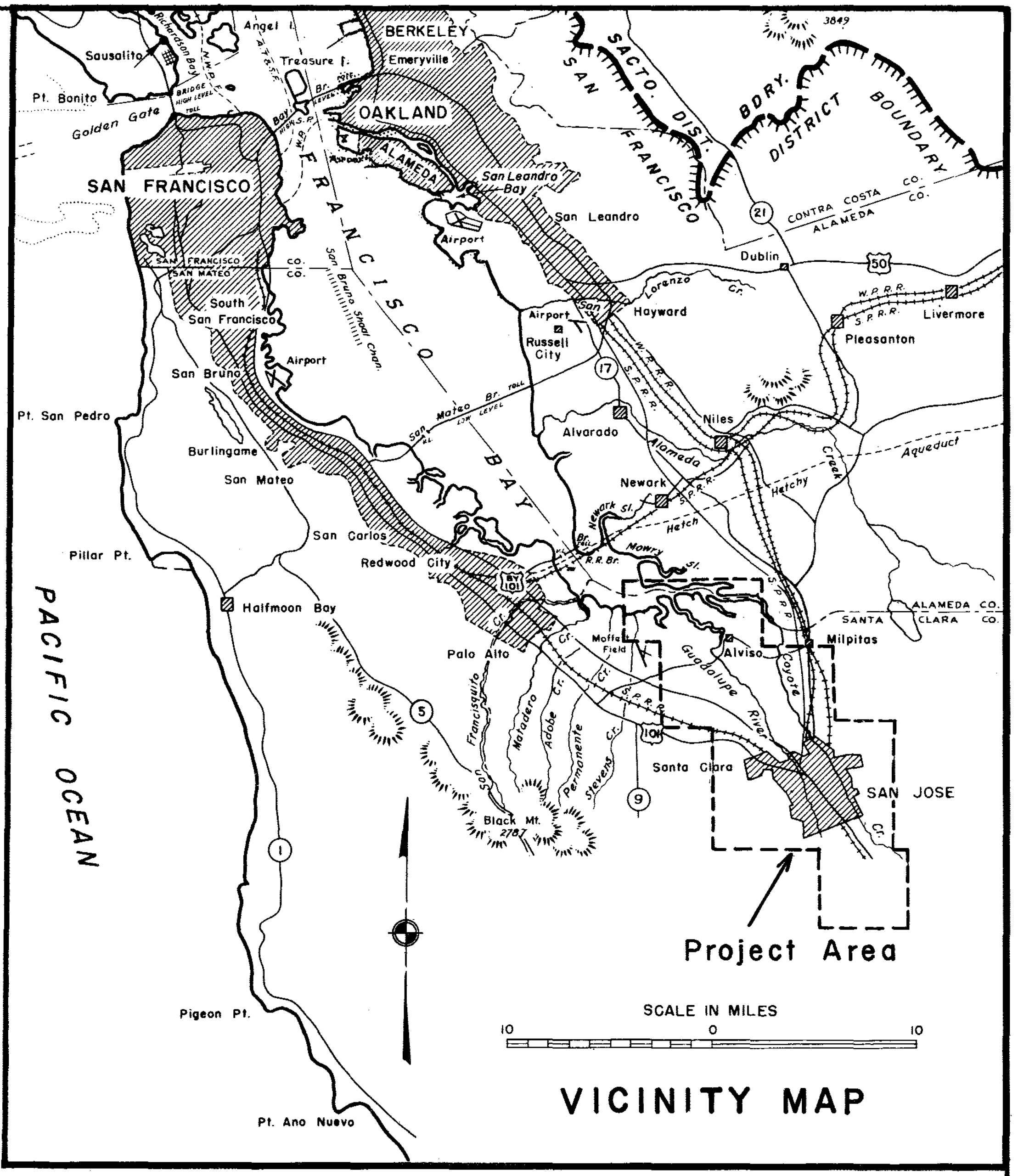
Flood Stage. The stage or elevation at which overflow of the natural banks of a stream or body of water begins in the reach or area under consideration.

Intermediate Regional Flood. A flood having an average frequency of occurrence in the order of once in 100 years although the flood may occur in any year. It is based on statistical analyses of streamflow records available for the watershed and analyses of rainfall and runoff characteristics in the "general region of the watershed."

Standard Project Flood. The flood that may be expected from the most severe combination of meteorological and hydrological conditions that are considered reasonably characteristic of the geographical region in which the drainage basin is located, excluding extremely rare combinations. Such floods, as used by the Corps of Engineers, are intended as practicable expressions of the degree of protection that should be sought in the design of flood control works, the failure of which might be disastrous.

Right or Left Bank. The bank on the right or left side of a river, stream, or watercourse looking downstream.

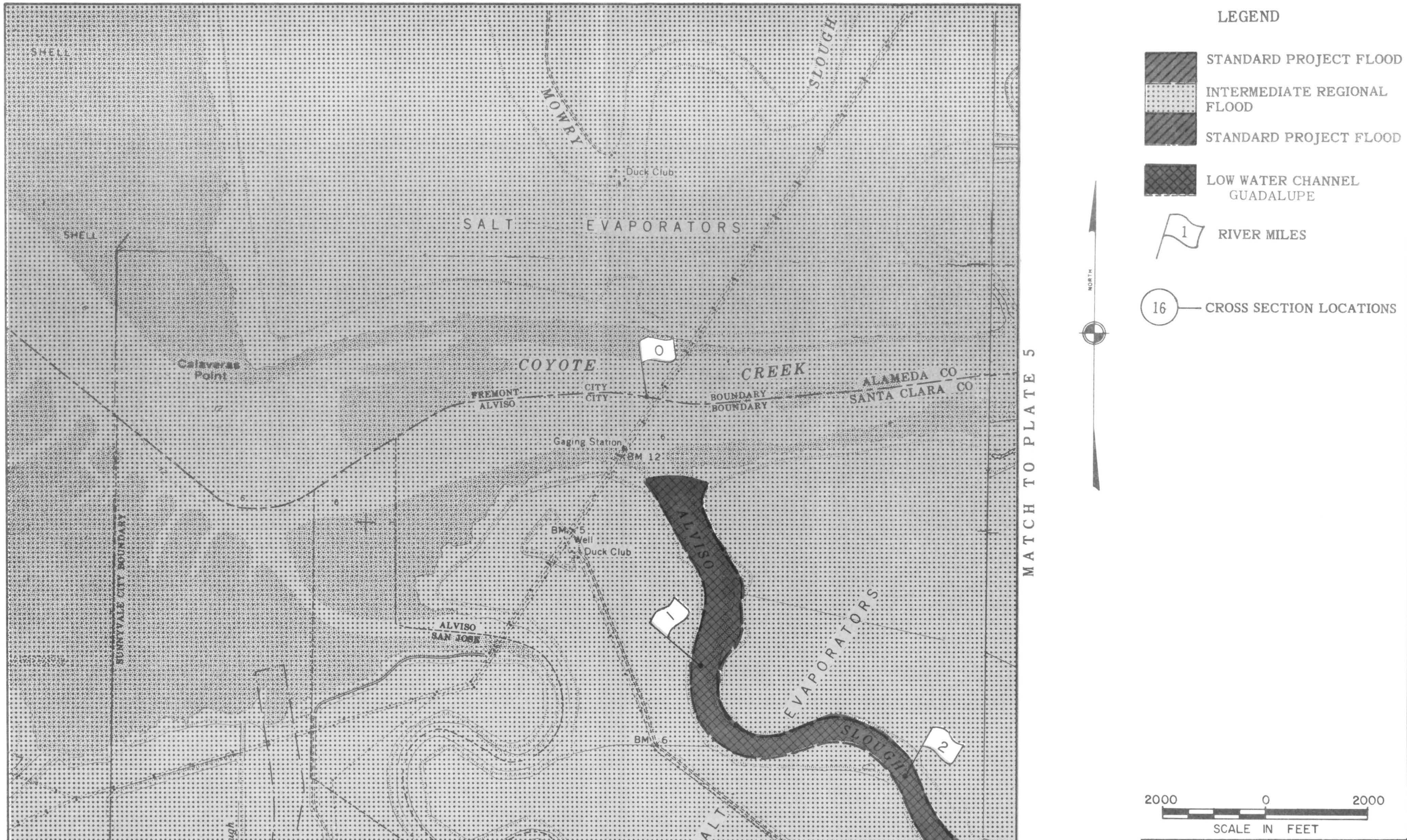




VICINITY MAP

FLOOD PLAIN INFORMATION STUDY
GUADALUPE RIVER
SANTA CLARA COUNTY, CALIFORNIA
INDEX OF FLOODED AREAS

U.S. ARMY ENGINEER DIST., SAN FRANCISCO, C OF E
FILE NO.
TO ACCOMPANY REPORT
DATED: JAN. 1972
78-53-4

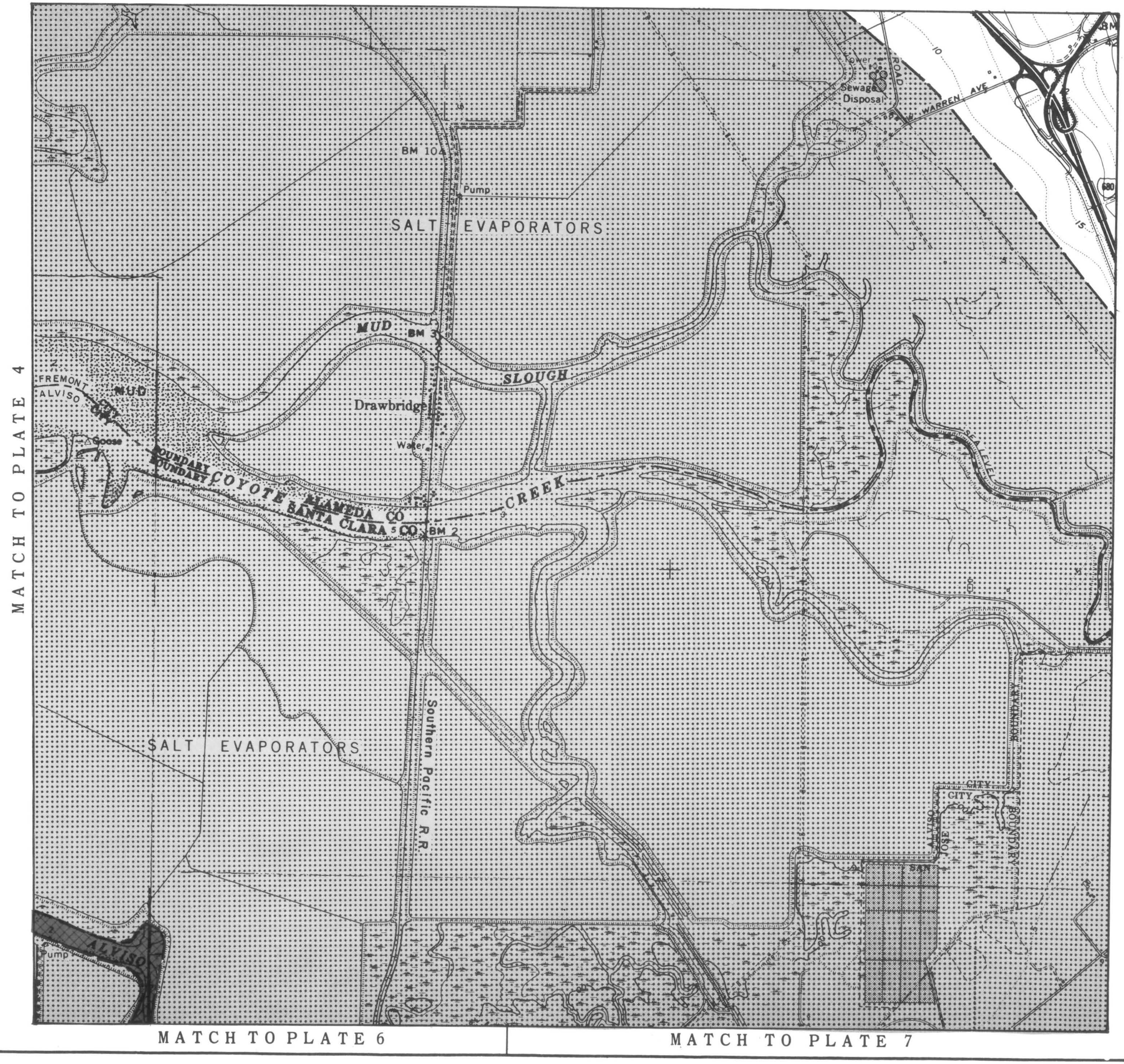


MATCH TO PLATE 6

FLOOD PLAIN INFORMATION STUDY
GUADALUPE RIVER
SANTA CLARA, CALIFORNIA

FLOODED AREAS

IN 10 SHEETS SHEET NO. 2
U.S. ARMY ENGINEER DIST., SAN FRANCISCO, C OF E
DRAWN: FILE NO.
TRACED: H.LEE TO ACCOMPANY REPORT
CHECKED: W.H.M. DATED JAN 1972 78-53-4



LEGEND

▨ STANDARD PROJECT FLOOD

▨ INTERMEDIATE REGIONAL FLOOD

▨ STANDARD PROJECT FLOOD

▨ LOW WATER CHANNEL GUADALUPE

1 RIVER MILES

16 — CROSS SECTION LOCATIONS

2000 0 2000

SCALE IN FEET

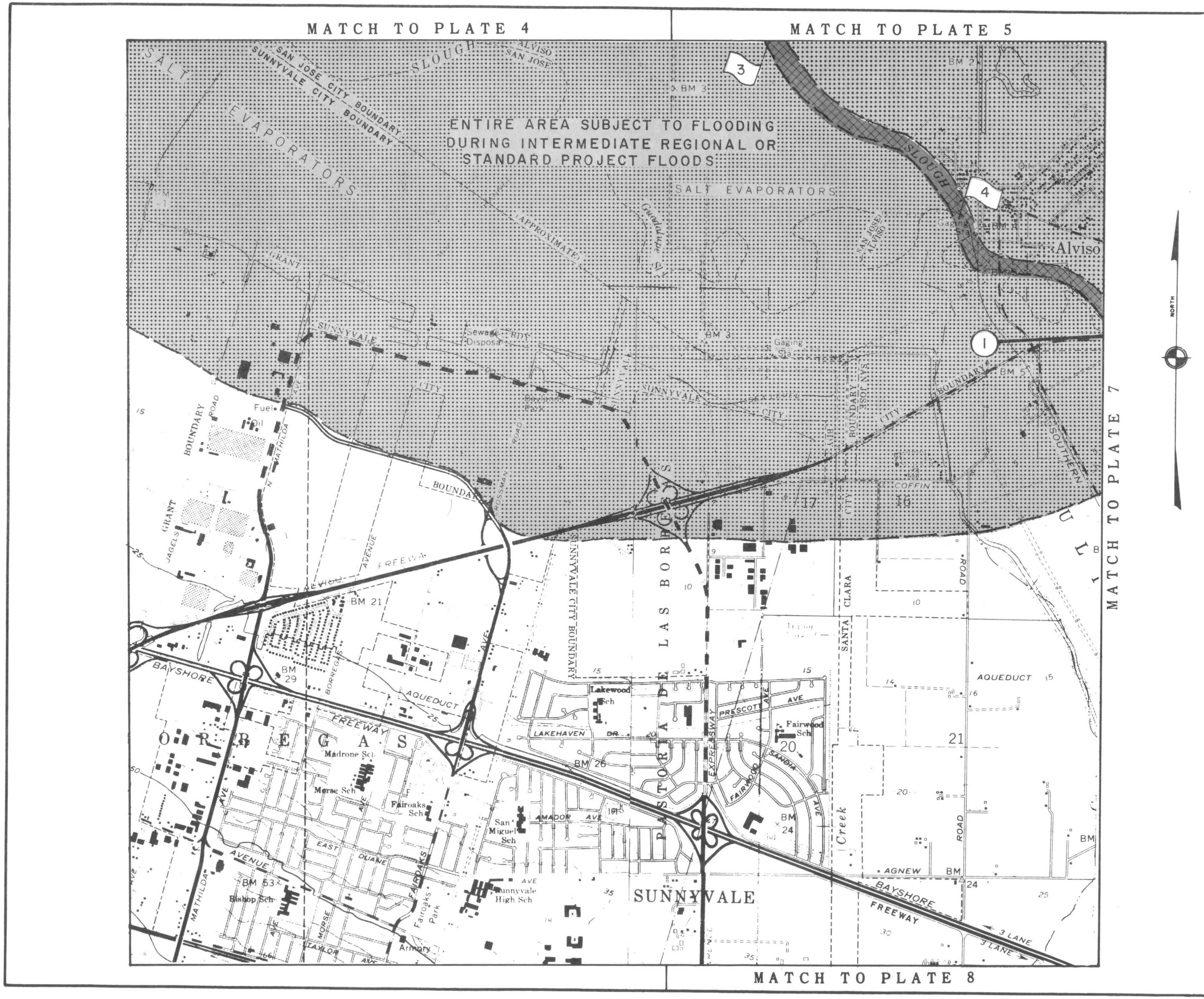
FLOOD PLAIN INFORMATION STUDY

GUADALUPE RIVER

SANTA CLARA, CALIFORNIA

FLOODED AREAS

IN 10 SHEETS SHEET NO. 3
U.S. ARMY ENGINEER DIST., SAN FRANCISCO, C OF E
DRAWN: FILE NO.
TRACED: **H.LEE** TO ACCOMPANY REPORT 78-53-4
CHECKED: W.H.M. DATED JAN 1972



LEGEND

▨ STANDARD PROJECT FLOOD

░ INTERMEDIATE REGIONAL FLOOD

▨ STANDARD PROJECT FLOOD

▩ LOW WATER CHANNEL

⚐ 1 RIVER MILES

⑯ CROSS SECTION LOCATIONS

GENERAL NOTES:

1. Flood limits shown do not include areas adjacent to floodway which might be flooded by tributary flow.
2. Contour interval is 5 feet
3. Limits of overflow indicated may vary some from actual location on ground because the contour interval and the scale of the map do not permit precise plotting of the flooded area boundaries.

2000 0 2000

SCALE IN FEET

FLOOD PLAIN INFORMATION STUDY

GUADALUPE RIVER

SANTA CLARA, CALIFORNIA

FLOODED AREAS

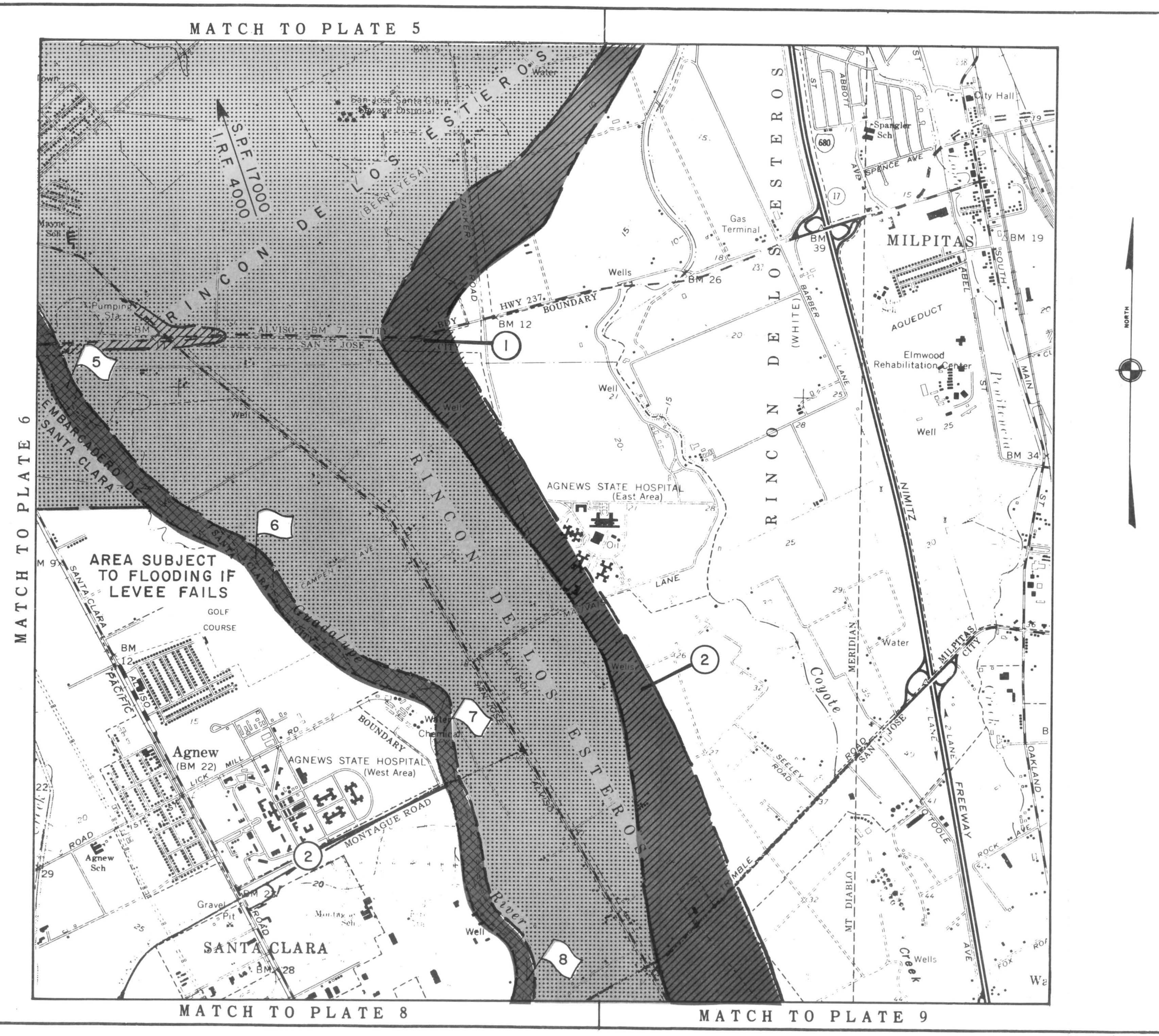
IN 10 SHEETS SHEET NO. 4

U.S. ARMY ENGINEER DIST., SAN FRANCISCO, C OF E

DRAWN: FILE NO.

TRACED: H.LEE TO ACCOMPANY REPORT

CHECKED: W.H.M. DATED JAN 1972 78-53-4



LEGEND

▨ STANDARD PROJECT FLOOD

░ INTERMEDIATE REGIONAL FLOOD

▨ STANDARD PROJECT FLOOD

▩ LOW WATER CHANNEL

1 RIVER MILES

16 —— CROSS SECTION LOCATIONS
SEE PLATE 15

GENERAL NOTES:

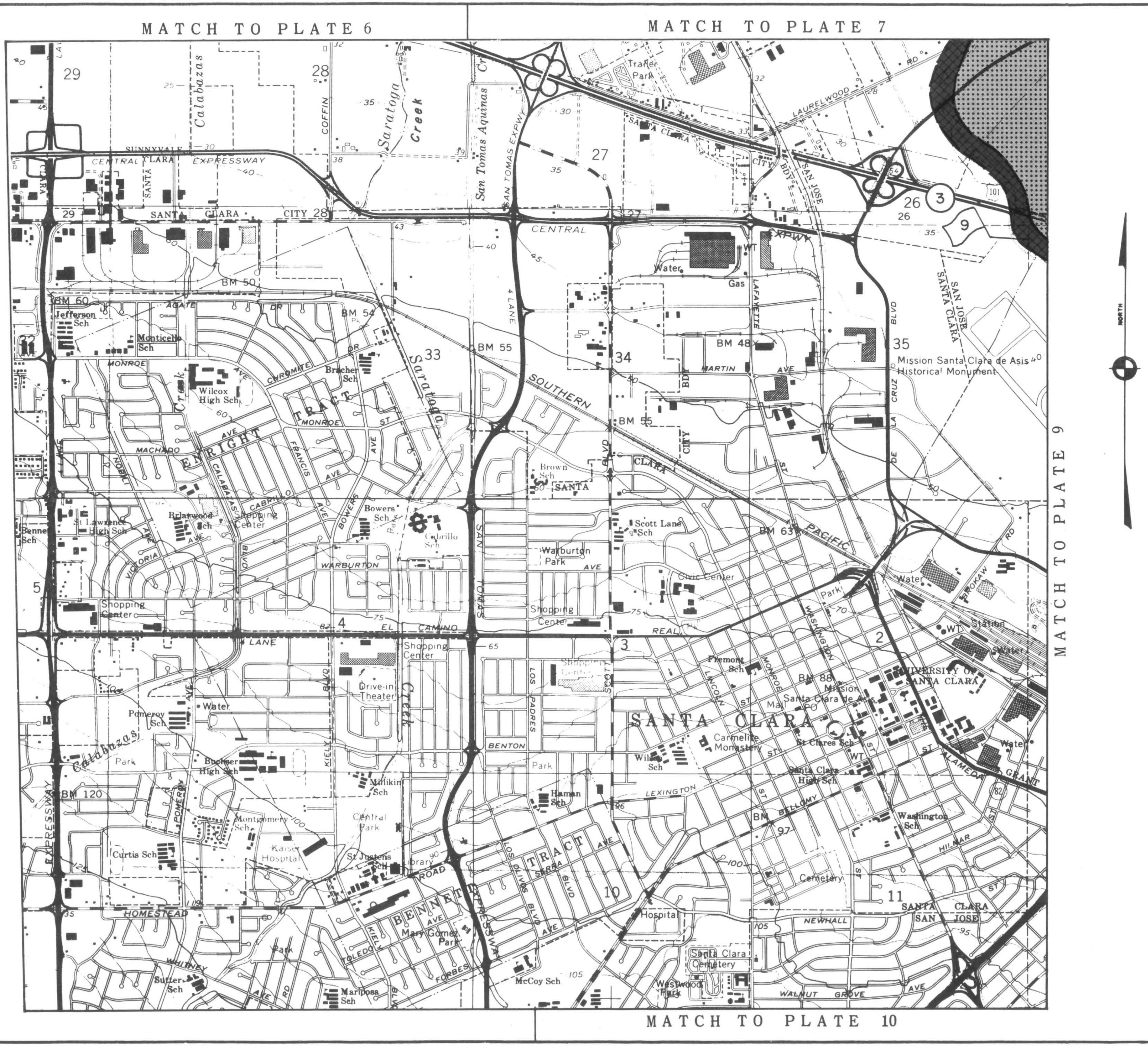
1. Flood limits shown do not include areas adjacent to floodway which might be flooded by tributary flow.
2. Contour interval is 5 feet
3. Limits of overflow indicated may vary some from actual location on ground because the contour interval and the scale of the map do not permit precise plotting of the flooded area boundaries.
4. $\xrightarrow{\text{S P F 17,000}}$ Overbank
I R F 4,000 Flow Quantity

2000 0 2000
SCALE IN FEET

FLOOD PLAIN INFORMATION STUDY
GUADALUPE RIVER
SANTA CLARA, CALIFORNIA

FLOODED AREAS

IN 10 SHEETS SHEET NO. 5
U.S. ARMY ENGINEER DIST., SAN FRANCISCO, C OF E
DRAWN: FILE NO.
TRACED: H.LEE TO ACCOMPANY REPORT
CHECKED: W.H.M. DATED JAN 1972 78-53-4



LEGEND

▨ STANDARD PROJECT FLOOD

▒ INTERMEDIATE REGIONAL FLOOD

▨ STANDARD PROJECT FLOOD

▩ LOW WATER CHANNEL

⚐ RIVER MILES

(16) CROSS SECTION LOCATIONS (SECTION NOT IN REPORT)

GENERAL NOTES:

1. Flood limits shown do not include areas adjacent to floodway which might be flooded by tributary flow.
2. Contour interval is 5 feet
3. Limits of overflow indicated may vary some from actual location on ground because the contour interval and the scale of the map do not permit precise plotting of the flooded area boundaries.

2000 0 2000

SCALE IN FEET

FLOOD PLAIN INFORMATION STUDY

GUADALUPE RIVER

SANTA CLARA, CALIFORNIA

FLOODED AREAS

IN 10 SHEETS SHEET NO. 6

U.S. ARMY ENGINEER DIST., SAN FRANCISCO, C OF E

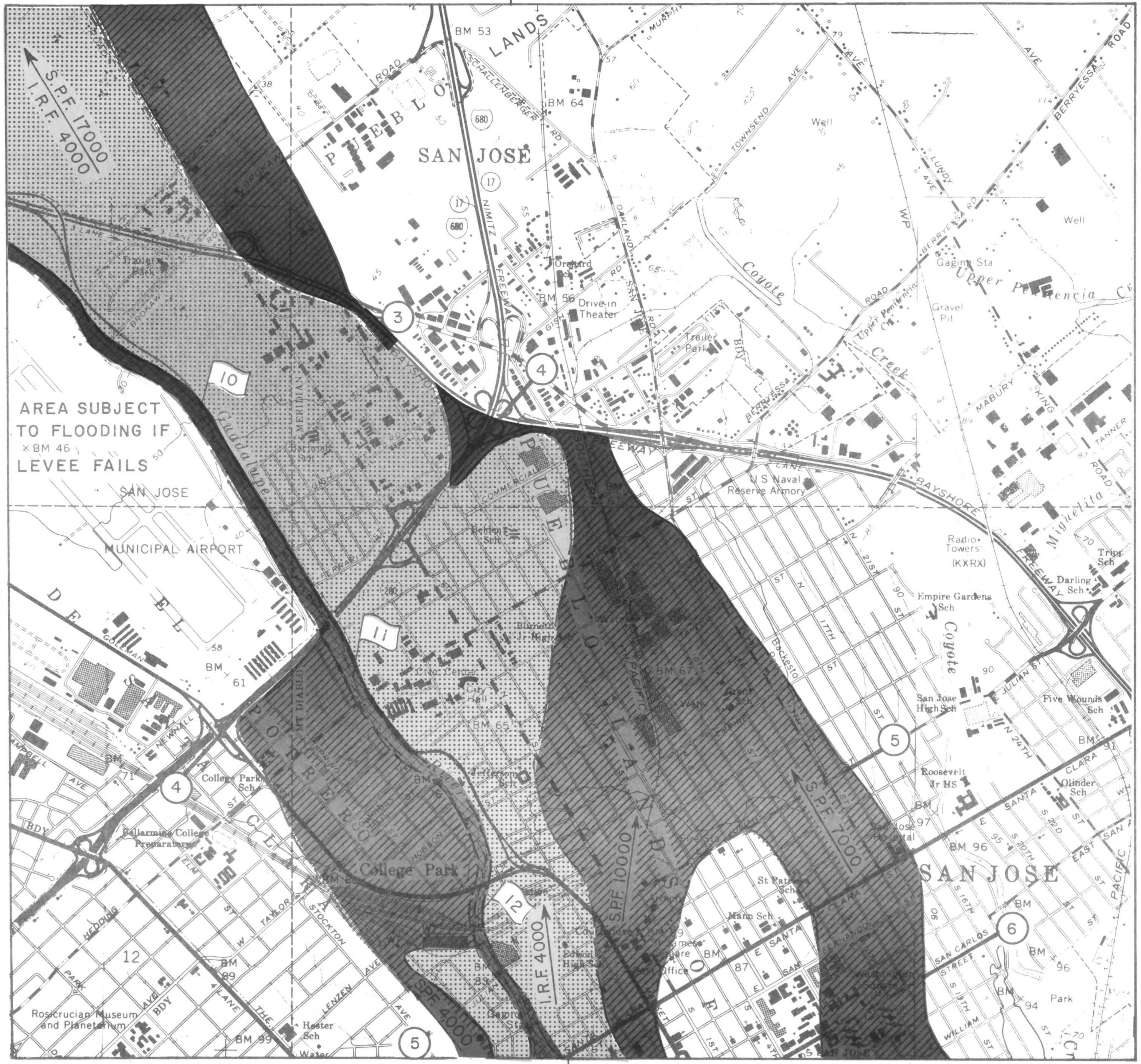
DRAWN: FILE NO.

TRACED: H.LEE TO ACCOMPANY REPORT 78-53-4

CHECKED: W.H.M. DATED JAN 1972

MATCH TO PLATE 7

MATCH TO PLATE 8



MATCH TO PLATE 10

MATCH TO PLATE 11

LEGEND

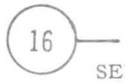
▨ STANDARD PROJECT FLOOD

░ INTERMEDIATE REGIONAL FLOOD

▨ STANDARD PROJECT FLOOD

▩ LOW WATER CHANNEL

RIVER MILES



CROSS SECTION LOCATIONS
SEE PLATE 16 FOR SECTION 5
OTHER SECTIONS NOT IN REPORT

GENERAL NOTES:

1. Flood limits shown do not include areas adjacent to floodway which might be flooded by tributary flow.
2. Contour interval is 5 feet
3. Limits of overflow indicated may vary some from actual location on ground because the contour interval and the scale of the map do not permit precise plotting of the flooded area boundaries.
4. S P F 17,000 Overbank
   I R F 4,000 Flow Quantity

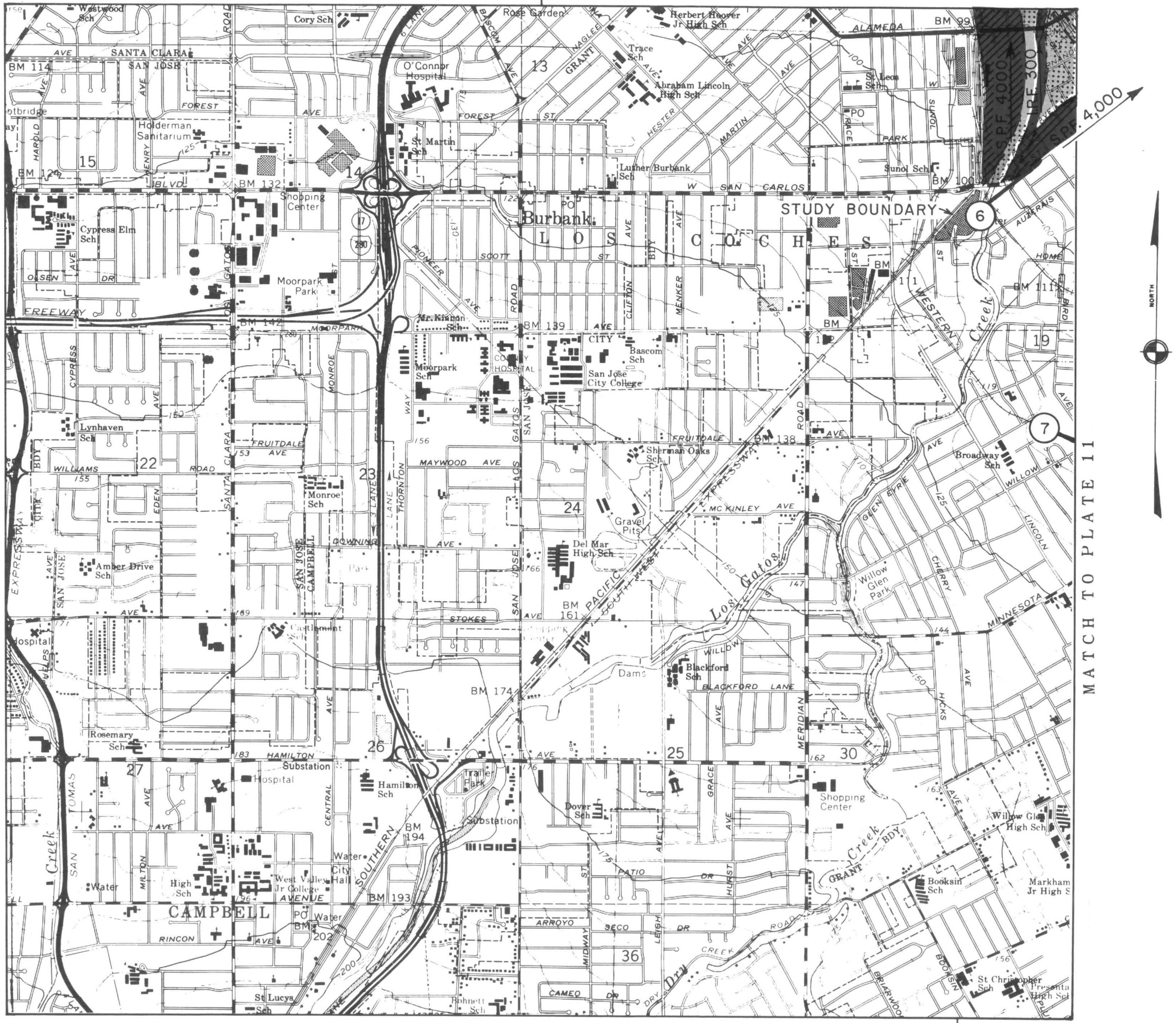
2000 0 2000
SCALE IN FEET

FLOOD PLAIN INFORMATION STUDY
GUADALUPE RIVER
SANTA CLARA, CALIFORNIA

FLOODED AREAS

IN 10 SHEETS SHEET NO. 7
U.S. ARMY ENGINEER DIST., SAN FRANCISCO, C OF E
DRAWN: FILE NO.
TRACED: H.LEE TO ACCOMPANY REPORT 78-53-4
CHECKED: W.H.M. DATED JAN 1972

MATCH TO PLATE 8



MATCH TO PLATE 12

LEGEND

▨ STANDARD PROJECT FLOOD

▒ INTERMEDIATE REGIONAL FLOOD

▨ STANDARD PROJECT FLOOD

▩ LOW WATER CHANNEL

1 RIVER MILES

16 — CROSS SECTION LOCATIONS

GENERAL NOTES:

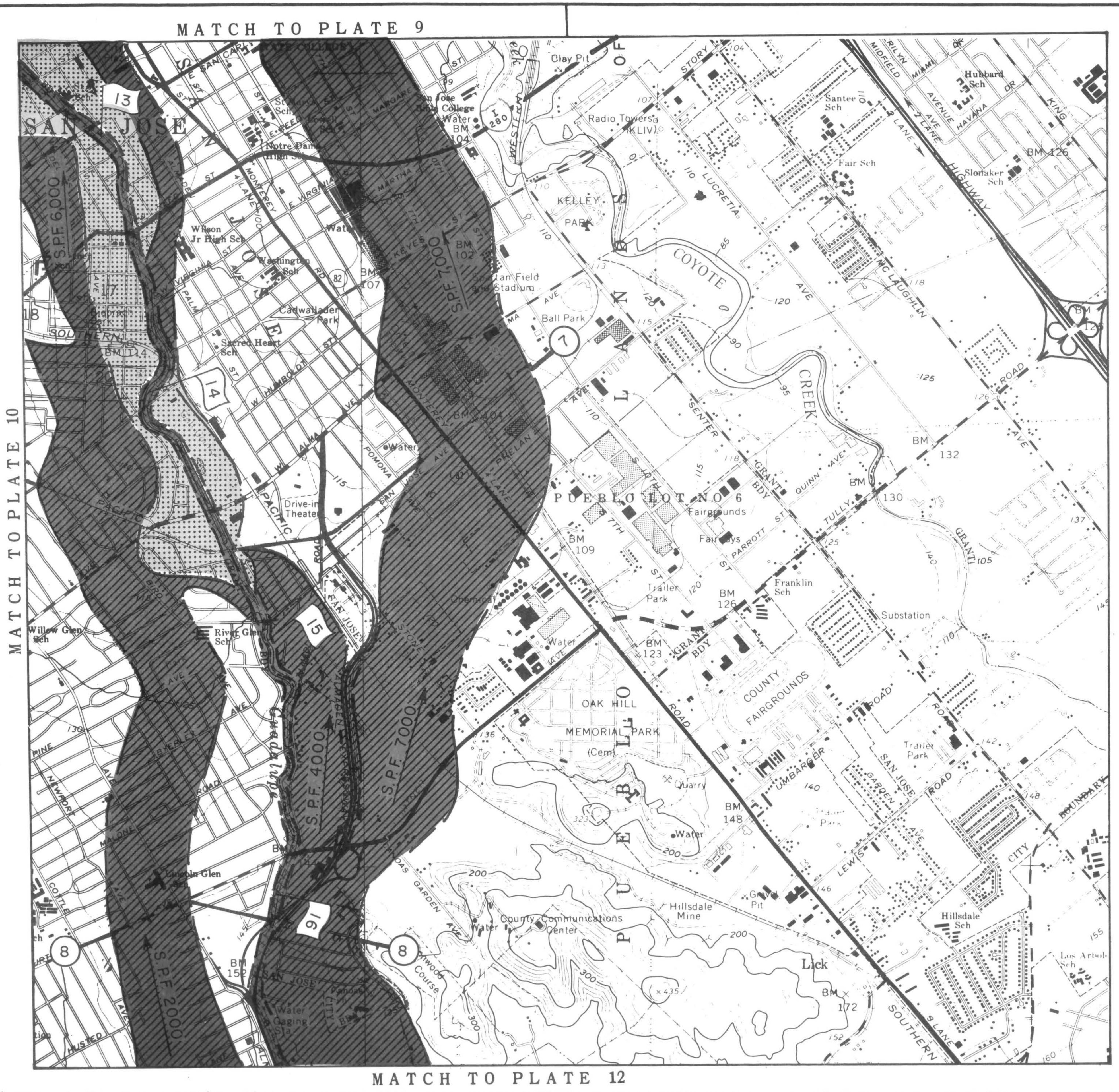
1. Flood limits shown do not include areas adjacent to floodway which might be flooded by tributary flow.
2. Contour interval is 5 feet
3. Limits of overflow indicated may vary some from actual location on ground because the contour interval and the scale of the map do not permit precise plotting of the flooded area boundaries.
4. S P F 4,000 Overbank → I R F 300 Flow Quantity

2000 0 2000
SCALE IN FEET

FLOOD PLAIN INFORMATION STUDY
GUADALUPE RIVER
SANTA CLARA, CALIFORNIA

FLOODED AREAS

IN 10 SHEETS SHEET NO. 8
U.S. ARMY ENGINEER DIST., SAN FRANCISCO, C OF E
DRAWN: FILE NO.
TRACED: H.LEE
CHECKED: W.H.M.
TO ACCOMPANY REPORT
DATED JAN 1972
78-53-4



LEGEND

▨ STANDARD PROJECT FLOOD

▨ INTERMEDIATE REGIONAL FLOOD

▨ STANDARD PROJECT FLOOD

▩ LOW WATER CHANNEL

1 RIVER MILES

16 — CROSS SECTION LOCATIONS
SEE PLATE 17 FOR SECTION 8, SECTION 7 NOT INCLUDED IN REPORT

GENERAL NOTES:

1. Flood limits shown do not include areas adjacent to floodway which might be flooded by tributary flow.
2. Contour interval is 5 feet
3. Limits of overflow indicated may vary some from actual location on ground because the contour interval and the scale of the map do not permit precise plotting of the flooded area boundaries.
4. S P F 2,000 Overbank → Flow Quantity

2000 0 2000
SCALE IN FEET

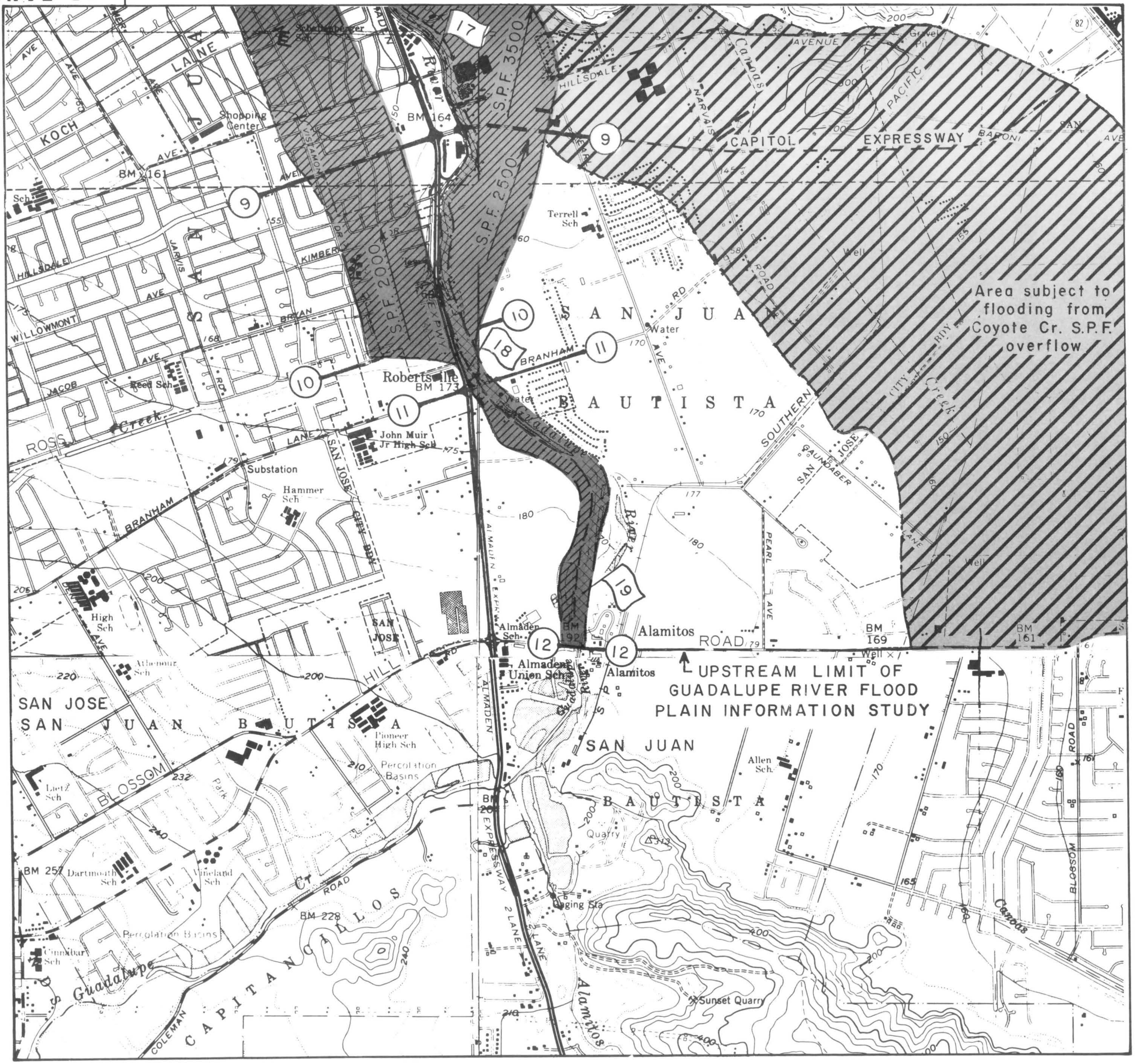
FLOOD PLAIN INFORMATION STUDY
GUADALUPE RIVER
SANTA CLARA, CALIFORNIA

FLOODED AREAS

IN 10 SHEETS SHEET NO. 9
U.S. ARMY ENGINEER DIST., SAN FRANCISCO, C OF E
DRAWN: FILE NO.
TRACED: H. LEE TO ACCOMPANY REPORT 78-53-4
CHECKED: W.H.M. DATED JAN 1972.

MATCH TO PLATE 10

MATCH TO PLATE 11



LEGEND

▨ STANDARD PROJECT FLOOD

░ INTERMEDIATE REGIONAL FLOOD

▨ STANDARD PROJECT FLOOD

▩ LOW WATER CHANNEL

RIVER MILES

16 — CROSS SECTION LOCATIONS
SEE PLATES 17 & 18

GENERAL NOTES:

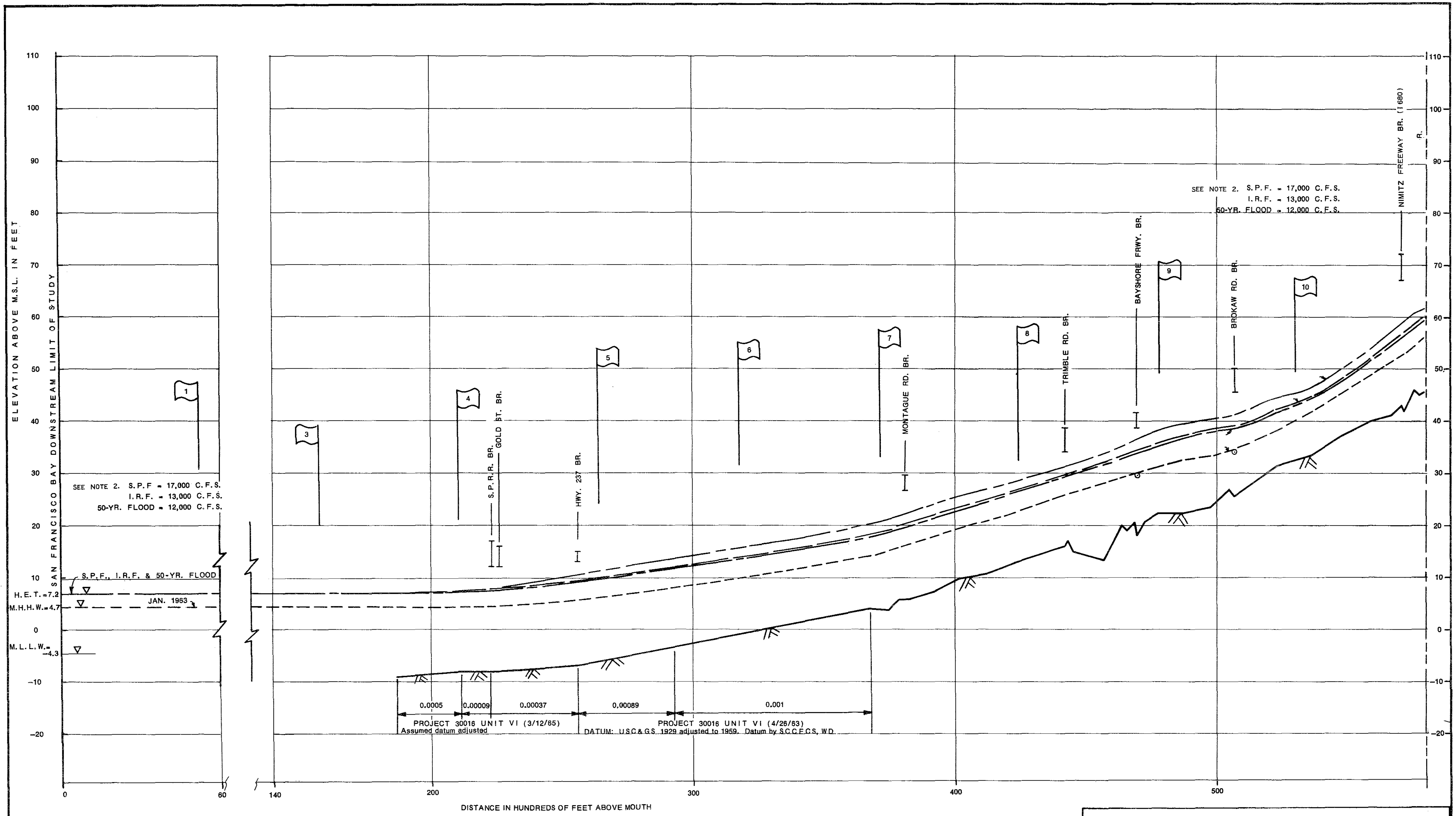
1. Flood limits shown do not include areas adjacent to floodway which might be flooded by tributary flow.
2. Contour interval is 5, 10, & 40 feet.
3. Limits of overflow indicated may vary some from actual location on ground because the contour interval and the scale of the map do not permit precise plotting of the flooded area boundaries.
4. SPF 3,500 Overbank → Flow Quantity

2000 0 2000
SCALE IN FEET

FLOOD PLAIN INFORMATION STUDY
GUADALUPE RIVER
SANTA CLARA, CALIFORNIA

FLOODED AREAS

IN 10 SHEETS
SHEET NO. 10
U.S. ARMY ENGINEER DIST., SAN FRANCISCO, C OF E
DRAWN:
FILE NO.
TRACED: H.LEE
CHECKED: W.H.M.
TO ACCOMPANY REPORT
DATED JAN 1972
78-53-4



NOTES:

1) FLOOD PROFILES REFLECT ONLY THE FLOOD FLOW THAT REMAINS IN CHANNEL AND NOT THE ELEVATION OF ANY OUT OF CHANNEL FLOW.

2) DISCHARGES LISTED REFLECT ONLY THE QUANTITY OF FLOW REMAINING IN THE CHANNEL -- FOR THE OVERBANK QUANTITIES SEE PLATES 7 THROUGH 12. FOR TOTAL POINT DISCHARGE SEE TABLE 6 IN THE TEXT.

LEGEND

——— — — ———	STANDARD PROJECT FLOOD (S.P.F.)
——— ——— ———	INTERMEDIATE REGIONAL FLOOD (I.R.F.)
——— — ———	50-YR. FLOOD
— — — — — — —	JAN. 1963 FLOOD
⊙	OBSERVED HIGHWATER MARK JAN. 1963 FLOOD BY C. OF E.
H.E.T.	HIGHEST ESTIMATED TIDE
M.H.H.W.	MEAN HIGHER HIGH WATER
M.L.L.W.	MEAN LOWER LOW WATER
2	RIVER MILES

FLOOD PLAIN INFORMATION STUDY

GUADALUPE RIVER

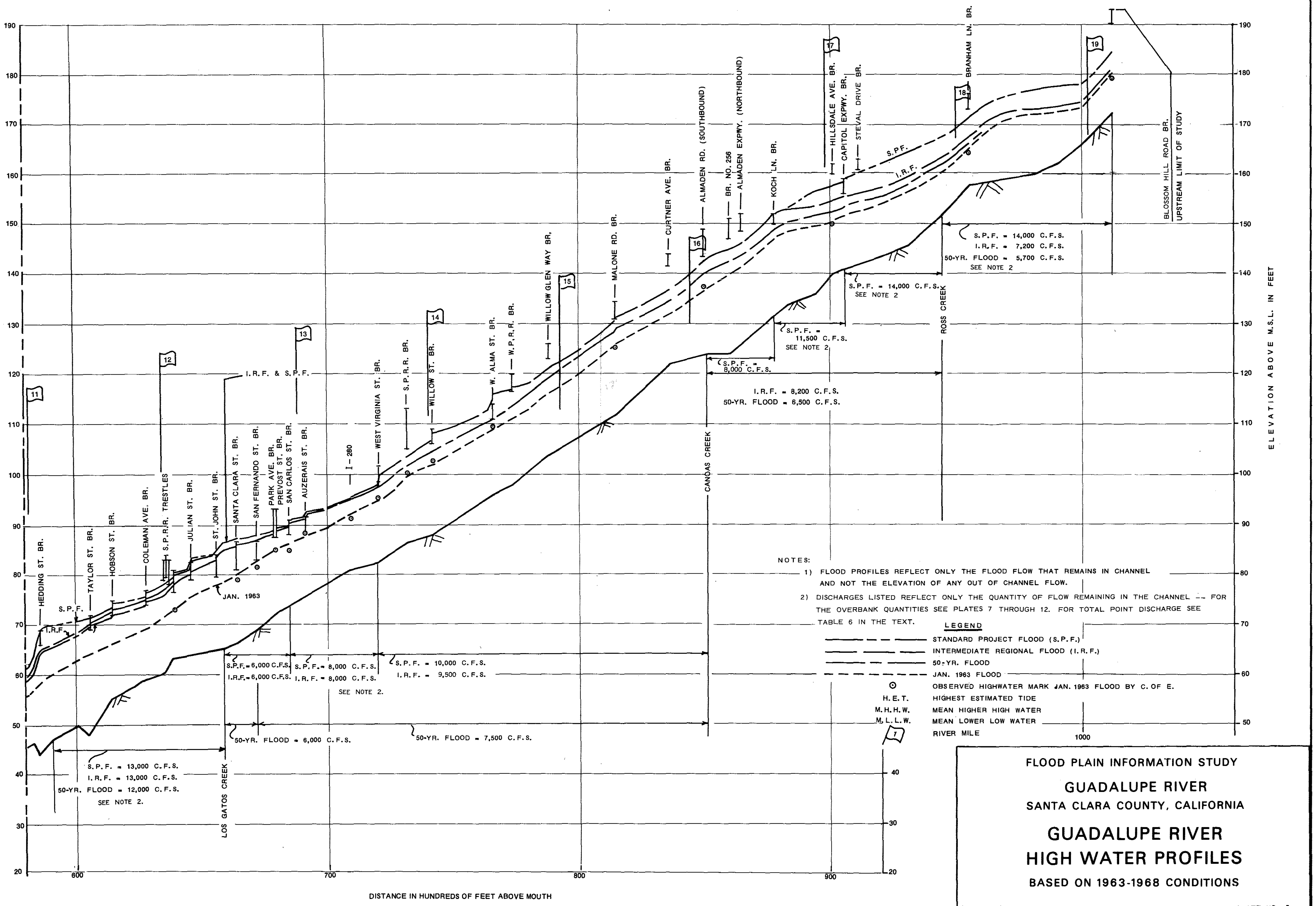
SANTA CLARA COUNTY, CALIFORNIA

GUADALUPE RIVER
HIGH WATER PROFILES

BASED ON 1963-1968 CONDITIONS

IN 2 SHEETS
SHEET NO. 1
U.S. ARMY ENGINEER DISTRICT, SAN FRANCISCO, CORPS OF ENGINEERS
DRAWN: E.C.K.
TRACED: C.L.
CHECKED:
TO ACCOMPANY REPORT
DATED: JAN 72
FILE NO.
78-33-1

PLATE 13



NOTES:

1) FLOOD PROFILES REFLECT ONLY THE FLOOD FLOW THAT REMAINS IN CHANNEL AND NOT THE ELEVATION OF ANY OUT OF CHANNEL FLOW.

2) DISCHARGES LISTED REFLECT ONLY THE QUANTITY OF FLOW REMAINING IN THE CHANNEL -- FOR THE OVERBANK QUANTITIES SEE PLATES 7 THROUGH 12. FOR TOTAL POINT DISCHARGE SEE TABLE 6 IN THE TEXT.

LEGEND

——— — — ———	STANDARD PROJECT FLOOD (S.P.F.)
——— ——— ———	INTERMEDIATE REGIONAL FLOOD (I.R.F.)
——— — ———	50-YR. FLOOD
— — — — — — —	JAN. 1963 FLOOD
⊙	OBSERVED HIGHWATER MARK JAN. 1963 FLOOD BY C. OF E.
H. E. T.	HIGHEST ESTIMATED TIDE
M. H. H. W.	MEAN HIGHER HIGH WATER
M. L. L. W.	MEAN LOWER LOW WATER
7	RIVER MILE

FLOOD PLAIN INFORMATION STUDY

GUADALUPE RIVER

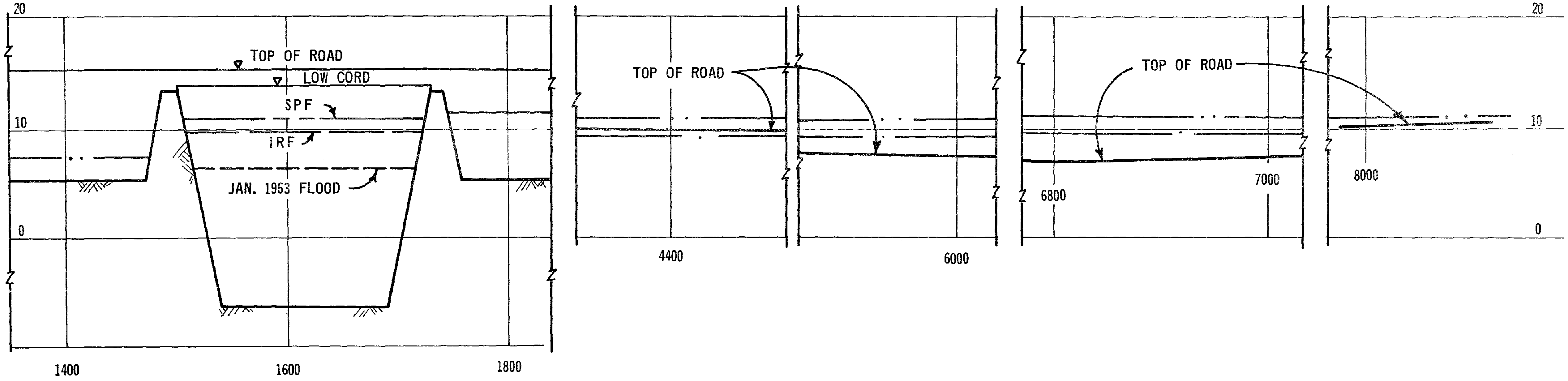
SANTA CLARA COUNTY, CALIFORNIA

GUADALUPE RIVER
HIGH WATER PROFILES

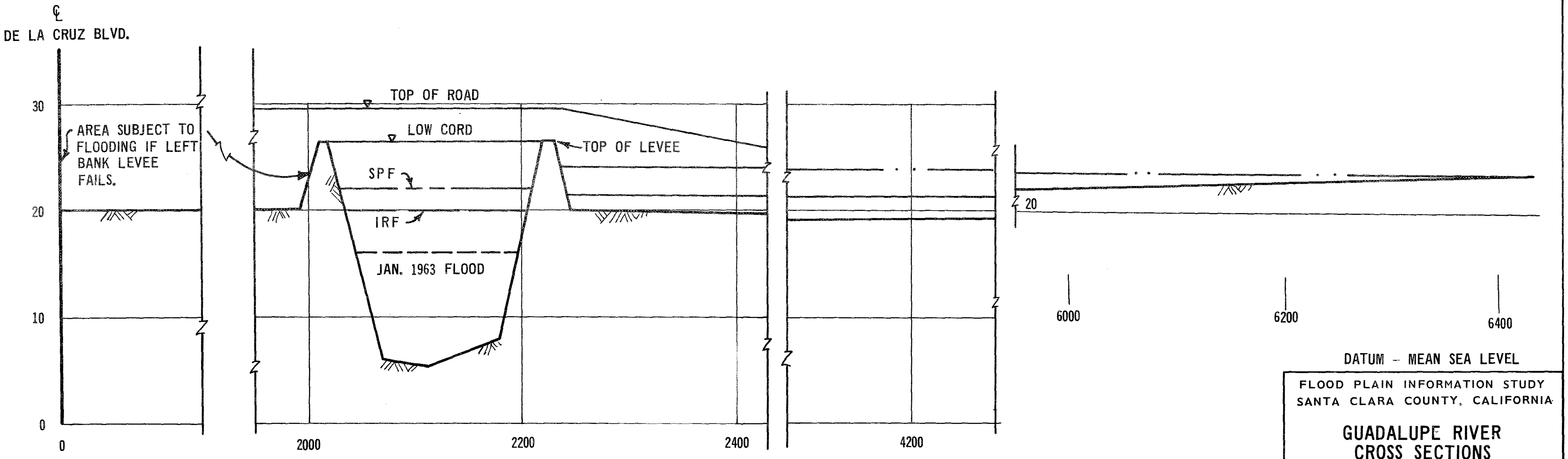
BASED ON 1963-1968 CONDITIONS

IN 2 SHEETS
SHEET NO. 2
U.S. ARMY ENGINEER DISTRICT, SAN FRANCISCO, CORPS OF ENGINEERS
DRAWN: E.C.K.
TRACED: L.K.H. & C.L.
CHECKED:
TO ACCOMPANY REPORT
DATED: JAN 72
FILE NO.
78-33-1

PLATE 14



SECTION 1 R.M. 4.8



SECTION 2
R.M. 7.2

CROSS SECTION LOOKING DOWNSTREAM

DATUM – MEAN SEA LEVEL

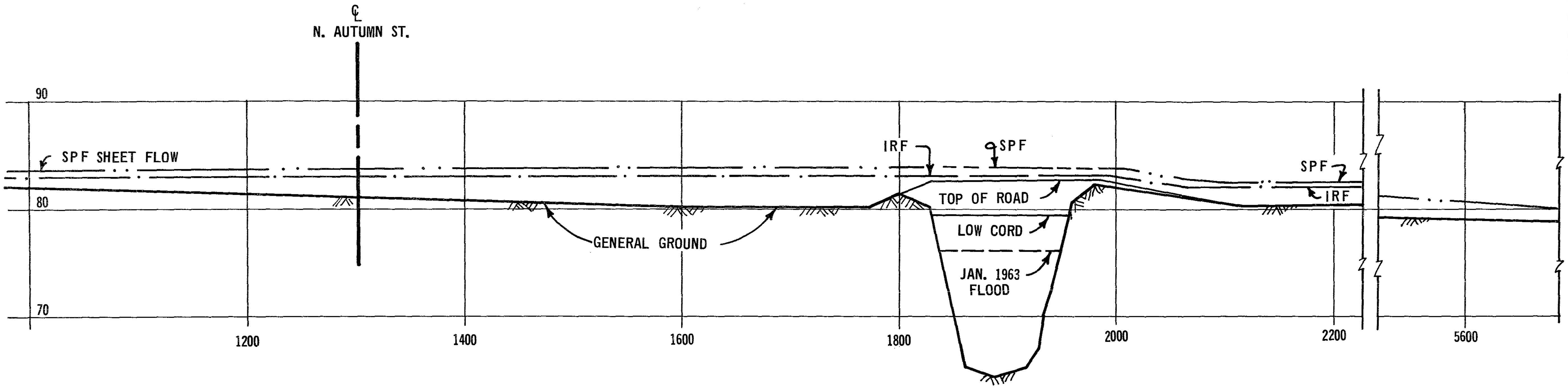
FLOOD PLAIN INFORMATION STUDY
SANTA CLARA COUNTY, CALIFORNIA

GUADALUPE RIVER
CROSS SECTIONS

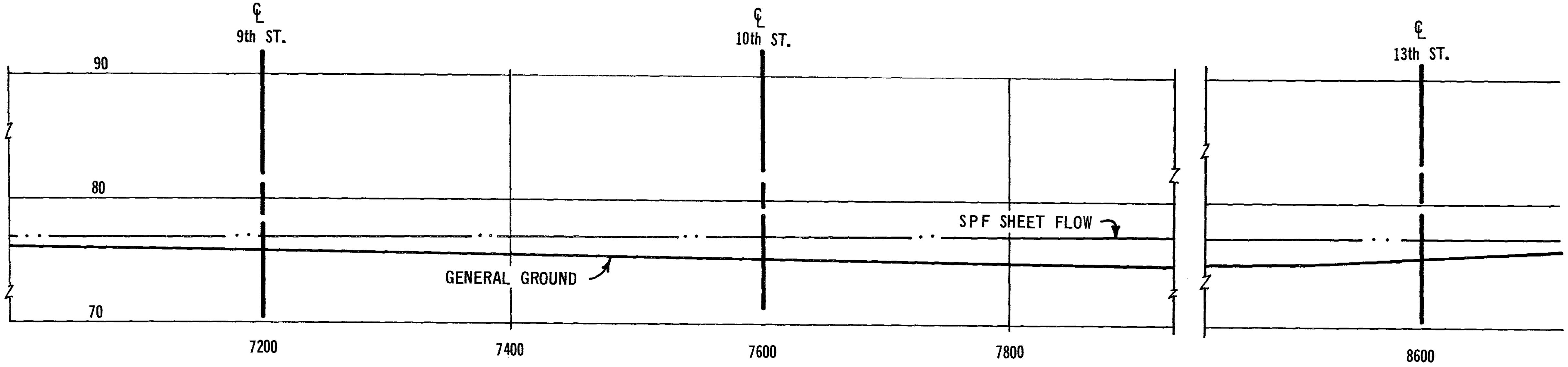
U.S. ARMY ENGINEER DIST., SAN FRANCISCO, C OF E

DATED JAN. 1972

PLATE 15



SECTION 5
R.M. 12.2



CONT. SECTION 5 @ R.M. 12.2

DATUM - MEAN SEA LEVEL

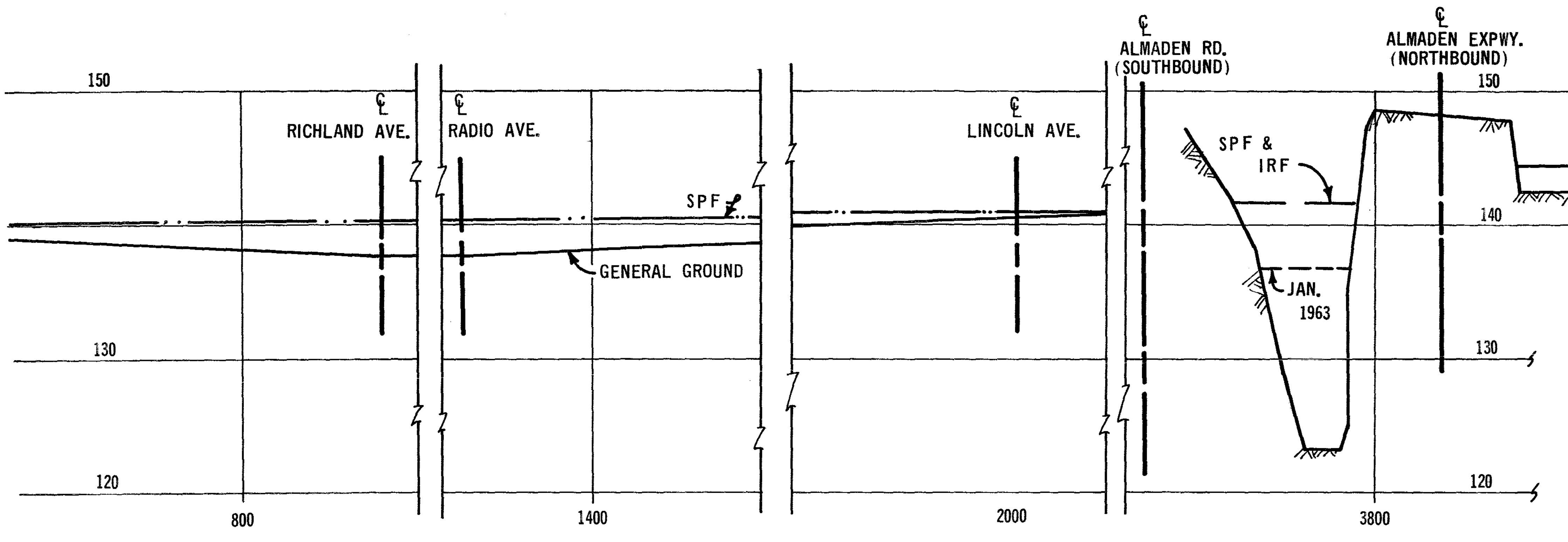
CROSS SECTIONS LOOKING DOWNSTREAM

FLOOD PLAIN INFORMATION STUDY
SANTA CLARA COUNTY, CALIFORNIA

GUADALUPE RIVER
CROSS SECTIONS

U.S. ARMY ENGINEER DIST., SAN FRANCISCO, C OF E

DATED JAN. 1972



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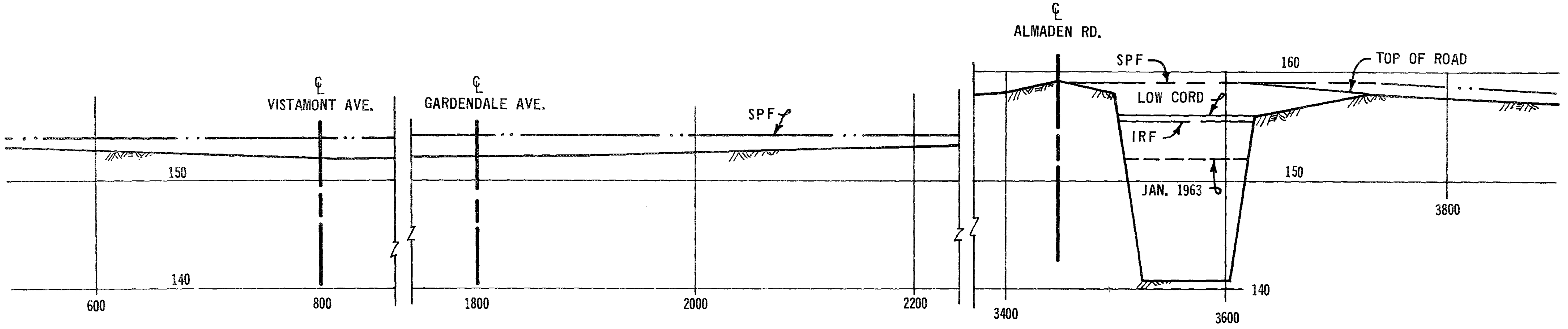


SECTION 9
R.M. 17.1

CROSS SECTION LOOKING DOWNSTREAM

DATUM – MEAN SEA LEVEL

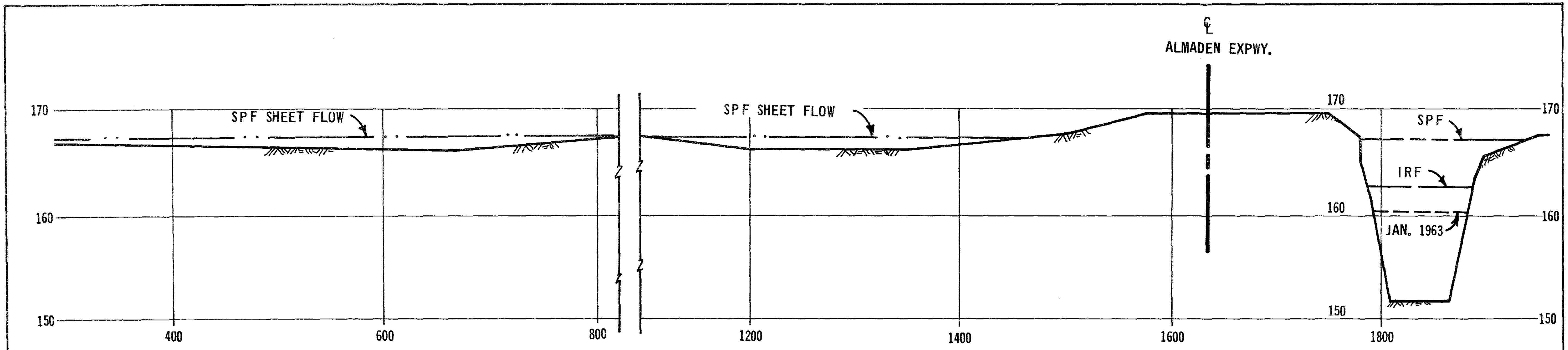
FLOOD PLAIN INFORMATION STUDY
SANTA CLARA COUNTY, CALIFORNIA

GUADALUPE RIVER
CROSS SECTIONS

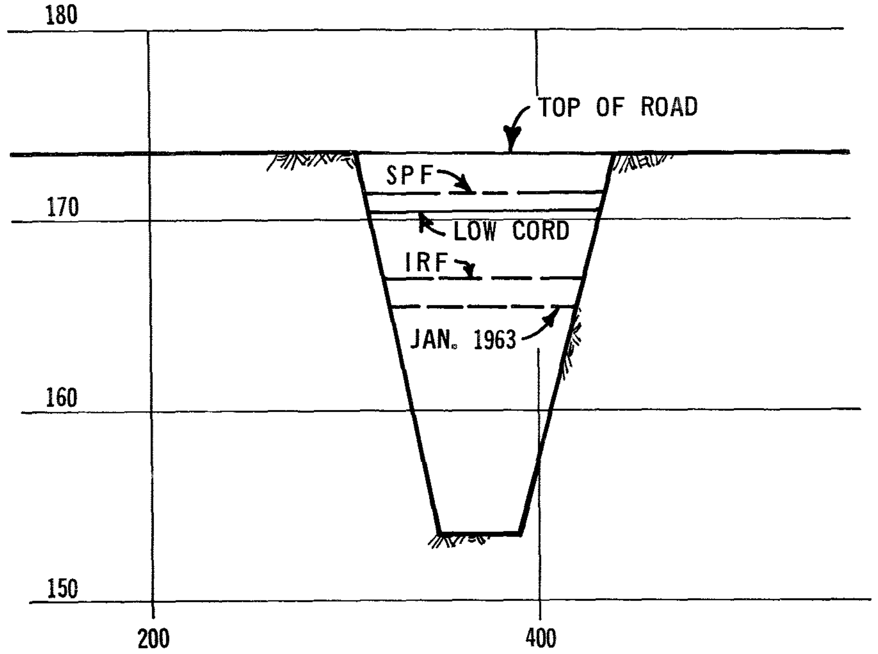
U.S. ARMY ENGINEER DIST., SAN FRANCISCO, C OF E

DATED JAN. 1972

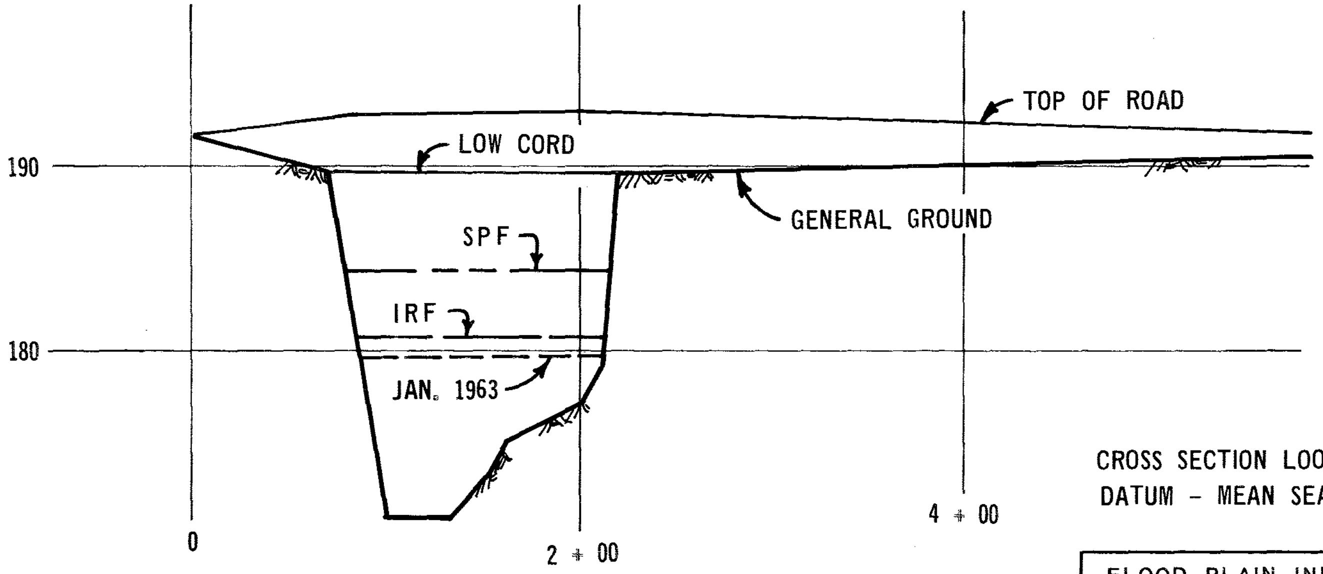
PLATE 17



SECTION 10 R.M. 17.6



SECTION 11 R.M. 18.1



SECTION 12 R.M. 19.1

CROSS SECTION LOOKING DOWNSTREAM
DATUM - MEAN SEA LEVEL

FLOOD PLAIN INFORMATION STUDY
SANTA CLARA COUNTY, CALIFORNIA

GUADALUPE RIVER
CROSS SECTIONS

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PLATE 18